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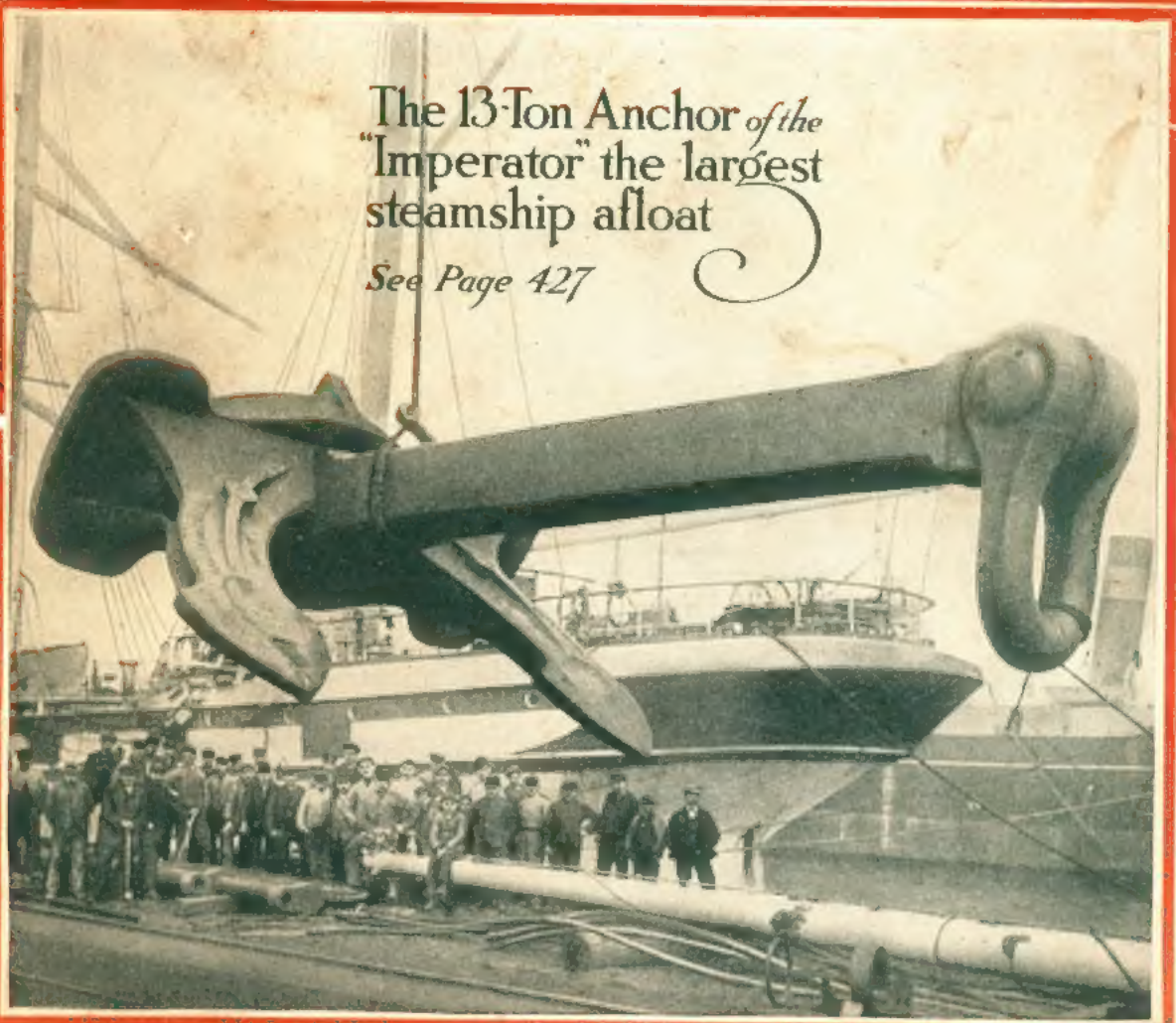

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See Page 427

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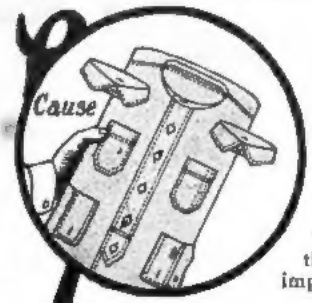

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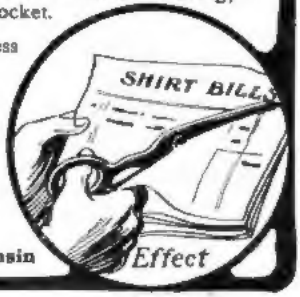

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175 Fifth Avenue, New York, and Temple House, Temple Avenue, E. C., London
FRANK A. MUNSEY, President. RICHARD H. TITHERINGTON, Secretary. CHRISTOPHER H. POPE, Treasurer.
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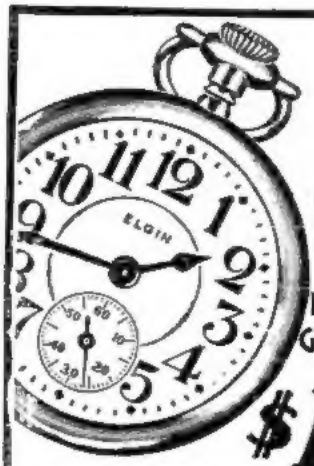
Stand acid test and expert examination. We guarantee them. See them first—then pay. Special Offer—1¼ Tiffany ring 1 ct. $5.98. Gents ring 1 ct. $6.98. 14k Stud 1 ct. $4.85. Sent C. O. D. for inspection. Catalog FREE, shows full line. Patent ring gauge included, 10c. The Baroda Co., Dept. 811, Leland & Dover Sts., Chicago



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30 DAYS FREE TRIAL

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All Such Corns

Can be Ended in Two Days

Apply a little Blue-jay plaster.

Right from that moment the corn becomes comfortable.

Then the B & B wax begins to loosen the corn, and in 48 hours the whole corn comes out.

The chemist who invented Blue-jay studied corns for years. And his method is now employed on a million corns a month.

No pain, no soreness, no discomfort. The way is gentle and results are sure.

Don't pare corns. Don't apply liquids. Don't use ancient methods in these scientific days.

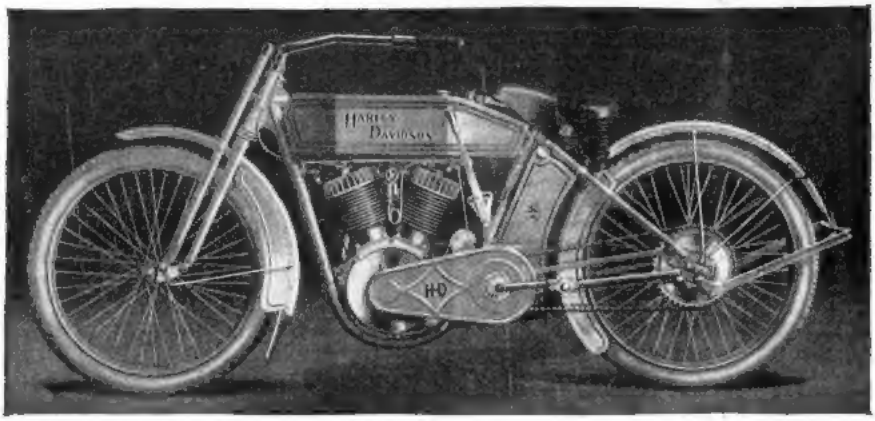
You can end the corn forever in this simple, modern way. Try it on one corn.

A In the picture is the soft B & B wax. It loosens the corn.
B stops the pain and keeps the wax from spreading.
C wraps around the toe. It is narrowed to be comfortable.
D is rubber adhesive to fasten the plaster on.

Blue-jay Corn Plasters

Sold by Druggists—15c and 25c per package
Sample Mailed Free. Also Blue-jay Bunion Plasters

Bauer & Black, Chicago and New York
Makers of Surgical Dressings, etc.



Sixty-eight Miles An Hour On a Harley-Davidson

IN buying a motorcycle there are five prime points to be considered. They are Speed, Economy, Comfort, Reliability and Durability.

The Harley-Davidson has these qualities to a greater degree than any other motorcycle made. Here's the proof:

Speed

In the Bakersfield, California Road Race, Frank Lightner's stock Harley-Davidson (the kind you can buy—not a special racing machine) attained a speed of 68 miles an hour.

Economy

The Harley-Davidson holds the World's Official Record for economy.

Comfort

The Harley-Davidson is the only motorcycle which incorporates the Full-Floteing Seat and Free Wheel Control. The Ful-Floteing Seat places 14" of concealed compressed springs between the rider and the bumps. The Free Wheel Control permits the starting and stopping of the machine without the tiresome pedaling or running alongside common with the ordinary motorcycle.

Reliability

The Harley-Davidson is the only machine which has ever been awarded a diamond medal and a thousand plus five score in an endurance contest. The plus five score was for its super-excellent performance. These awards were made by the National Federation of American Motorcyclists.

Durability

The first Harley-Davidson made, over eleven years ago, has covered now over one hundred thousand miles and is still giving satisfaction today, retaining even its original bearings.

Seven departments of the United States Government use a total of nearly 4000 of these machines.

This in itself is proof of its superiority. If you want a machine that will give and continue to give entire satisfaction from every point of view we would suggest that you call on our local dealer for demonstration or write for catalog.

HARLEY-DAVIDSON MOTOR COMPANY

PRODUCERS OF HIGH GRADE MOTORCYCLES FOR OVER ELEVEN YEARS

325 B Street MILWAUKEE, WISCONSIN

The RAILROAD and CURRENT MECHANICS

Vol. XXI. AUGUST, 1913. No. 3.

COMMITTEE OF ENGINEERS SELECTED BY THE INTERSTATE COMMERCE COMMISSION TO ASCERTAIN THE EXACT VALUE OF ALL THE RAILROADS IN THE UNITED STATES. STANDING, LEFT TO RIGHT: J. S. WORLEY, E. F. WENDT, R. A. THOMSON, SILVUS THEIS, FRIGHT, H. M. [illegible] W. D. [illegible]

[illegible] by Harris & Ewing, Washington, D. C.

WILL SPEND $15,000,000 VALUING OUR RAILROADS.

BY FRANKLYN FISHER.

THE task that confronts the Interstate Commerce Commission in ascertaining the true value of all the railroad property in the United States will be when completed, the largest appraisement ever made in the world. It is

doubtful if the following figures, which were secured after weeks of research through the files of the Interstate Commerce Commission at Washington, have ever been presented before to the readers of any magazine.

There are in this country over 350,000 miles of railroads in operation. Of this figure 250,000 miles is single track, while the remainder is second, third, fourth, fifth, and sixth track, together with yard tracks and sidings. Every foot of this is owned by private individuals or corporations, and every foot of it comes under the supervision of the Interstate Commerce Commission.

Most Gigantic Appraisement.

Figuring only the single-track road in the United States, there is more than three-fourths of all the railroads in North and South America — 250,000 miles of single track in the United States against about 327,000 on the western hemisphere.

Compared with Europe — which has only 207,000 miles — we have in this country about 50,000 more miles of track. Europe and Asia combined have only about 270,000 miles, so we have nearly as much as these two continents together. The total mileage of single track of the world is about 640,000 miles, and nearly half of it is within the boundaries of the United States.

To haul the trains of this country there are over 60,000 locomotives. Over 2,500,000 cars of all kinds make up these trains. To handle the business of these roads and to operate the trains about 1,670,000 human beings are recorded on the pay-rolls.

The total amount of wages paid in one year is about $1,210,000,000. On June 30, 1911, the par value of the amount of railway capital outstanding, according to the returns of the companies filing reports with the Interstate Commerce Commission, was $19,208,935,081. Of the total stock outstanding 32.35 per cent paid no dividends, but that stock that did produce dividends paid on the average of 8.03 per cent.

About 1,000,000,000 passengers are carried every year over these tracks and nearly 2,000,000,000 tons of freight. The passengers pay nearly $1,000,000,000 a year to ride, and shippers pay yearly freight-bills of nearly $2,000,000,000. Uncle Sam pays a little over $50,000,000 a year to have his mail transported by train, and the express companies pay nearly $75,000,000. The total amount received by the railroads for the year ending June 30, 1911, was $2,789,761,669, while the total operating expenses were $1,915,054,005.

About $15,000,000 will be spent by the Interstate Commerce Commission to determine the physical value of the immense railroad properties of the United States. The work, which has just been started, will take probably from ten to fifteen years to complete.

In addition to the huge task that is daily being carried on by the commission, this new department has just been added. It may change the whole scheme of railroad operation in this country and may result in government ownership of all the common carriers.

The real reason for the work just started, aside from its possibilities, is to place in the hands of the I. C. C. statistics by which it may decide knotty problems of freight and passenger rates.

Several States have delegated commissions to perform the work of securing the true value of the roads within their boundaries, but the results secured by these commissions has not been so accurate or complete as the Congress of the United States desires. Neither has the work been handled from a national point of view, hence the recent decision of Congress to have the work done by a committee of experts

Many Experts Will Be Employed.

This committee, which has just been appointed and which is now starting the stupendous task of collecting the information necessary to render a final accurate report, was chosen with great care, and the Interstate Commerce Commission is of the opinion that it has selected five able men who will produce results.

An amendment to the law passed by Congress in 1887, entitled, "An Act to Regulate Commerce," was introduced in the lower House by Representative William C. Adamson, of Georgia.

It passed the House and was fathered

through the Senate by Senator Robert M. La Follette, of Wisconsin, passing that body and being approved on March 1, 1913. This amendment instructs the Interstate Commerce Commission to start, within sixty days after the bill's approval, the work of placing a physical valuation on all the property owned, operated, or controlled by every railroad subject to the provisions of the Act of 1887.

This amendment also authorizes the commission to employ such experts and other assistants as may be necessary to carry on the work. It gives the commission power to appoint examiners who can administer oaths, examine witnesses, and take testimony. The commission is to make an inventory which shall list in detail the property of every common carrier

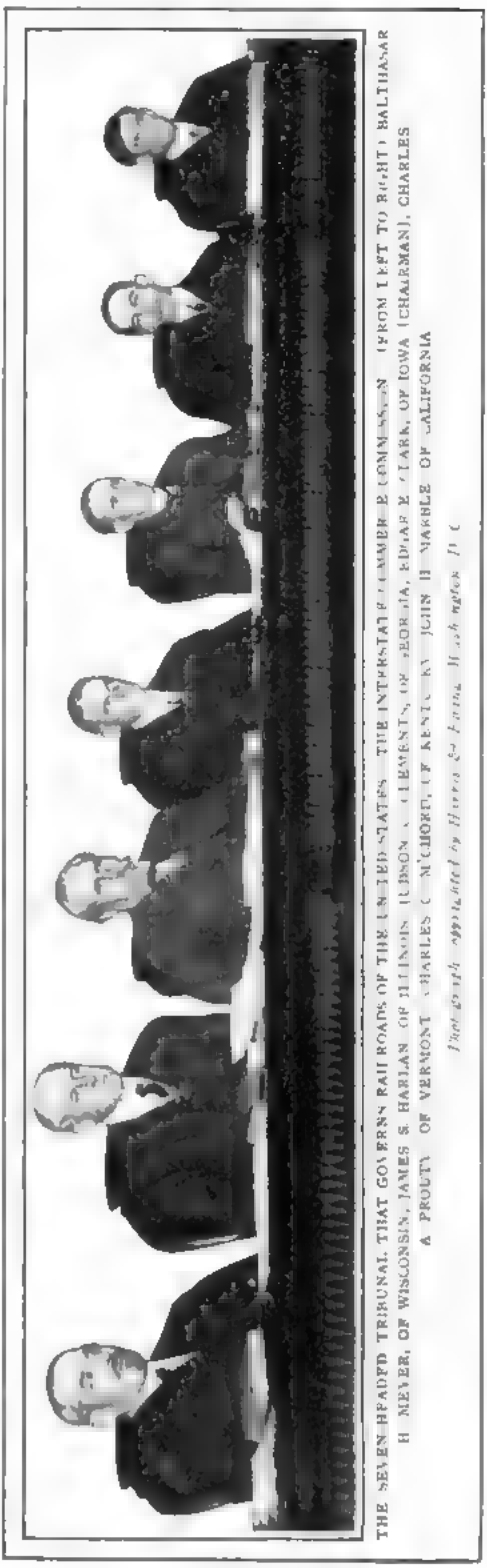
Each piece of property must be valued in three ways: first, the original cost to date; second, the cost of reproduction new; and third, the cost of reproduction less depreciation.

Accompanying this must be an analysis of the methods used to determine these costs and the reason for any differences. The commission, in addition to placing a value on each piece of property, must render an additional report on the manner of arriving at such values.

The report must also state in detail the original cost of all lands, rights of way, and terminals used or owned by the common carriers. They must also set forth the present value of these lands.

As an illustration of the difficulties of valuing terminal properties and the manner of arriving at the real value of such property, it is not a simple matter of determining the value of adjoining property and valuing the terminal property from those values, because the value of the adjoining property is determined from its proximity to the terminal

The land adjoining any railroad terminal is occupied by business houses which ship a great deal of freight and are located near the terminal to save cartage charges and to ship and receive their freight more quickly. Thus it is shown that property adjoining terminals has a considerable increased value be-



THE SEVEN-HEADED TRIBUNAL THAT GOVERNS RAILROADS OF THE UNITED STATES. THE INTERSTATE COMMERCE COMMISSION (FROM LEFT TO RIGHT) BALTHASAR H. MEYER, OF WISCONSIN; JAMES S. HARLAN, OF ILLINOIS; JUDSON C. CLEMENTS, OF GEORGIA; EDGAR E. CLARK, OF IOWA (CHAIRMAN); CHARLES A. PROUTY, OF VERMONT; CHARLES C. McCHORD, OF KENTUCKY; JOHN H. MARBLE, OF CALIFORNIA

Photograph copyrighted by Harris & Ewing, Washington, D. C.

cause of the presence of the terminal. Placing a valuation on the terminal property must be based on other sources.

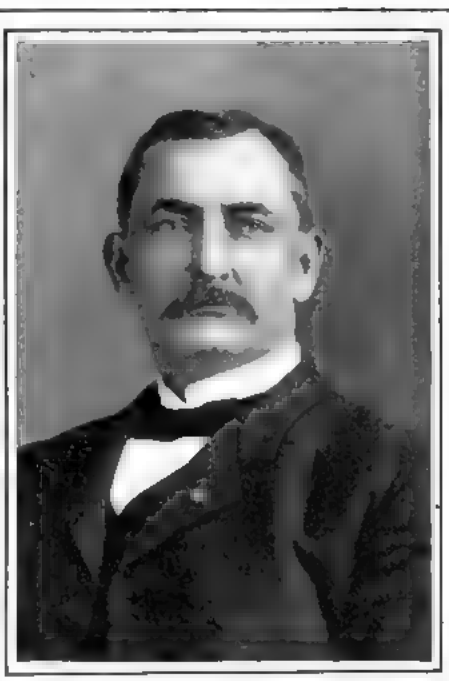
The law calls for a separate report on all property held by the railroads for purposes other than those of a common carrier. This means that the committee will have to find out all about the property held by the roads as an investment.

A history of the present organization of each road must be compiled and that of any corporation which has operated the road before the present organization. In securing this information, the committee will also finance and report in detail the transactions of the corporations up to date.

This will bring out the details of watered stock and will determine whether the company is capitalized beyond its real value when these figures are placed in comparison with those of the road's physical value.

From this comparison the Interstate Commerce Commission will decide whether the prevailing freight rates are charged in respect to the real value of the property plus a certain percentage of profit, or whether the rates are determined from the capitalization of the company and are arbitrarily made high enough to pay certain dividends on the stock.

Another enormous detail that must be fully ascertained and included in the reports is that of the gift of right of ways or other lands by the Federal government, States, counties, municipalities, or by individuals, associations, or corporations, and the value of the concessions granted in return for these gifts.



REPRESENTATIVE WILLIAM C. ADAMSON OF GEORGIA WHO INTRODUCED IN CONGRESS THE BILL CALLING FOR THE EXPENDITURE OF FIFTEEN MILLION DOLLARS TO VALUE UNITED STATES RAILROAD PROPERTY

Photograph copyrighted by Harris & Ewing Washington D. C.

Railroads Must Help the Committee.

Almost every city in the United States has given something at some time to the railroads. In the case of the transcontinental roads, the Federal government has presented them with many miles of right-of-way and many acres of land adjoining their right-of-ways.

The law provides that railroad companies shall help the valuation committee in their work and cooperate in any manner that the commission may request. Any authorized agent of the committee is to have access to the books and property of the roads, and nothing can be kept secret from the committee.

In the event of a railroad company refusing to comply with the requirements of this law a penalty of five hundred dollars for each day of the continuance of the offense will be imposed.

There are five members on the valuation committee. In order to simplify the work the country has been divided into five sections, one for each man, who, with assistants, will handle that territory.

There will be frequent conferences of the committee, probably in Washington, and at these meetings they will assist one another in securing the best results.

When the report of a certain property is in the hands of the commission, and a tentative valuation has been placed upon it, the law provides that the owners of the property shall be notified of the valuation by registered letter. The Attorney-General of the United States, the Governor of the State in which the property is located, and such additional parties as the commission shall desig-

nate shall be notified in the same identical manner.

Thirty days is allowed for the purpose of filing a protest to the tentative valuation, and if none is filed, then the valuation becomes final. If a protest is filed, then the Interstate Commerce Commission is to set a date for the hearing and is to pass upon any objections.

If the commission is convinced that the valuation of the property is wrong, then it is to modify the figures as it sees fit and make a final valuation. All final valuations are to be published and will become evidence in all judicial proceedings brought against any order of the Interstate Commerce Commission.

Who the Men Are.

When the working plans of the committee have been approved by the commission, forces will be organized to push the work in the field. When these are running smoothly more help will be added and the work will be pushed on the most extensive scale feasible, consistent with efficiency.

The board of engineers selected by the commission to assist in the valuation work has the following membership: Robert A. Thompson, Edwin F. Wendt, William D. Pence, John S. Worley, and Howard M. Jones.

Mr. Thompson is fresh from the same sort of work, having been, since 1911, chief engineer of the State Railroad Commission of California, where he has had charge of extensive valuation work. He is a Texan by birth and is about forty years old.

Educated at the University of Texas, he received the degree of master of arts in 1893 and that of civil engineer in 1900. For a time he was an instructor in civil engineering at the university, leaving to handle construction work for the Kansas City Southern and other railways. For eleven years he was chief engineer of the Texas State Railroad Commission, but resigned from that position to become chief engineer for the Wichita Falls and Southwestern Railroad. In this position he located and constructed about three hundred miles of railway in western Texas and Oklahoma, which is now a part of the Missouri, Kansas and Texas.

SENATOR ROBERT M. LA FOLLETTE, OF WISCONSIN, WHO GUIDED THE BILL THROUGH THE UNITED STATES SENATE, AND URGED THE PRESIDENT TO MAKE IT A LAW.

Harris & Ewing

Mr. Wendt is a Pittsburgher and for years has been employed in the engineering department of the Pittsburgh and Lake Erie Railroad. He was born in New Brighton, a suburb of Pittsburgh, and was educated at Geneva College, graduating in 1888.

In that year he joined the engineering forces of the Pittsburgh and Lake Erie and has been with that road ever since. He started as an axman and gradually worked up to the position of assistant engineer in charge of maintenance of way, construction, and contract work.

During the time he held this position the road was greatly extended, and in many places entirely reconstructed. Nearly all the important structures were rebuilt and a number of branch lines constructed under his supervision.

Mr. Pence is another member of the board who has had considerable experience in the work that he has just been selected to perform. He has just left the Wisconsin State Railroad and State Tax Commission, on which he held the

position of chief engineer. He is a university professor, but has had considerable practical experience.

For seven years he was a professor at the University of Illinois, from which he was graduated as a civil engineer Seven years more he served as professor of civil engineering at Purdue University, and, since 1906, he has been professor of railway engineering at the University of Wisconsin in addition to the position he held with the State commissions

Mr. Jones is a Southerner, and is a graduate of the Vanderbilt University at Nashville, Tennessee. He also graduated later from Union College, Schenectady, New York, with the degree of bachelor of engineering. His specialty is bridges and buildings. He not only has been connected with railroads, but has served with bridge companies as well. During the past six years he has supervised the construction of two large reenforced concrete and steel bridges across the Cumberland River at Nashville, besides nearly a hundred bridges of less importance. He was secured by the commission as an expert in this branch of the work.

Mr. Worley was secured by the commission from his private practise as a consulting engineer in Kansas City, Missouri. His work of recent years has been along the lines of water-works systems, sewer systems, electric light and power plants, *et cetera*. He has, however, in the past built railroads and interurban electric roads, and has, in connection with his work as consulting engineer, had a great deal of valuable experience in examining and auditing the books and accounts of various railroads. He was graduated from the University of Kansas as bachelor of science. He holds a master's degree from the Engineering School.

These are the men who are directing this great work under the supervision of the Interstate Commerce Commission. From the list of their attainments it will be seen that their combined experience covers almost every phase of the work to be done.

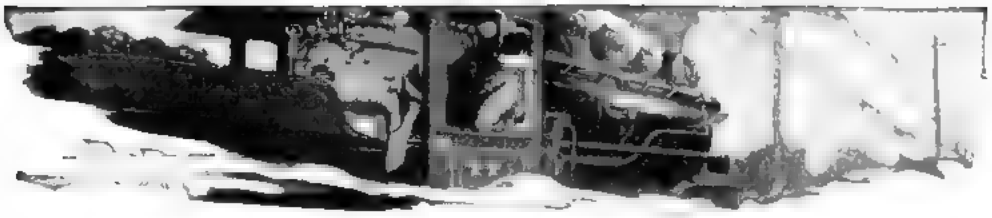
THE PRESIDENT DREAMS.

BY ARTHUR SOMERS ROCHE.

THUMP o' flatties poundin' in a snoozin' brakie's ear;
Shrill o' whistle blowin' when the terminal is near;
Memories of hours when the flood was on the track;
Stokin' "Twenty-Seven" till I thought I'd bust my back;
Tales o' wreck and ruin and the songs old-timers sang—
Gee, to mingle just once more with the roundhouse gang!

But I'm held by the strings of Duty
And I'm cursed by the god Routine
The Road—it's a thing of beauty,
A wonderful, smooth machine
And I'm at its head; you'll notice
The "President" on my door—
Ah, me, for the pleasant lotus
I ate in the days of yore
The days when my stunt was over—
When ended the engine's run,
And my bed was as soft as clover;
Work ceased; now it's *never* done.
I am rich; I have fame and power,
But health—and my youthful joys!
A million I'd give for an hour—
Back with the roundhouse boys!

Snort o' frightened cattle in the crowded Beef Trust car.
Crash o' baggage smashin' where the hustlin' wrestlers are;
Curse of Uncle Toby when the engine ran behin',
Hollerin' for pressure or he'd see I got a fine!
Memories of days gone by, ere life had lost its tang
Gee, to mingle just once more with the roundhouse gang!



THE RAILROAD POLICE.

Special Detectives of the Big Railroad Systems Who Protect Life and Property, Foil Dishonest Claimants, Trace Missing Freight, and Trail the Fugitive Bandit to His Lair.

BY H. A. KOACH.

EVERY important railroad and transportation company in the United States has its staff of detectives and police. This organization is generally know as the special agents' department, although the title of its chief varies on different roads. It is one of the most important and necessary divisions of the railway service. The general public knows practically nothing of what it does to make travel safe and to protect property. Men who rub shoulders with the special agents have little idea of their duties and risks.

The work of a special agent covers a wide field. There is no phase of transportation that it does not touch at one time or another. It is often highly specialized. To succeed in it a man needs brain far more than brawn. Here are a few of the principal activities of the special agents briefly outlined.

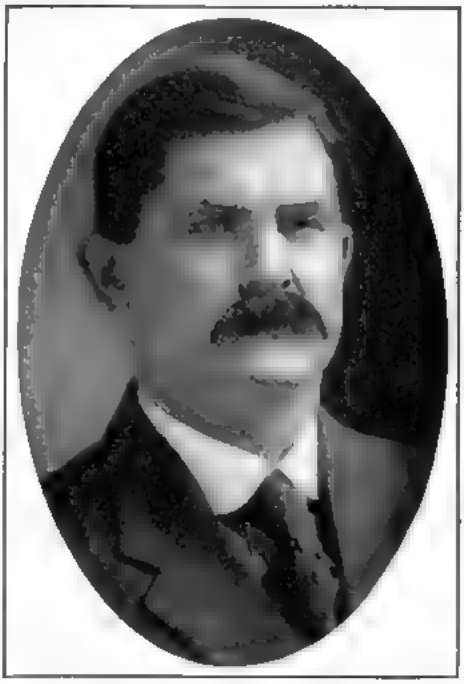
H. B. GERMAIN, CHIEF OF THE DETECTIVES OF THE SANTA FE SYSTEM

Photograph by Weke, Topeka, Kansas

The freight claim department concerns itself chiefly with but two classes of claims — overcharge and loss and damage. The question of overcharge is one that requires an accurate knowledge of classification, rates, and weights. Loss and damage claims are much harder to handle. It is through claims of this class that unscrupulous per-

sons try to take advantage of the transportation company. To find the truth requires not only careful investigation, but also a knowledge of human nature.

The freight claim department carries the investigation to a certain point, then, if there is any doubt, the special agents' department takes it up. Not infrequently, after an apparently reasonable claim has been allowed by the freight claim department, something leads to the conclusion that that department has been deceived. It is the special agent's task to sift the matter and settle it one way or the other.



J. W. CONNELLY, THE CHIEF DETECTIVE FOR FOUR BIG SYSTEMS

Photograph by Prince Washington D. C.

The gentlemen who call on manufacturers, jobbers, and retailers and procure from them copies of records and other exact information are "from the freight claim department," but they are really special agents, temporarily employed there. By means of their patient investigations the railroad is enabled to place the responsibility for loss or damage and to fix an accurate amount of compensation, if any.

In personal injury cases and in other suits that are brought to trial the legal department secures from special agents evidence in addition to that which claim agent and counsel have been able to find. The special agent is also required to locate witnesses who will be available when needed.

When a wreck or other accident occurs the special agent usually is either first on the scene or arrives with the wreck-train. He helps to care for the injured. To him is turned over the personal property belonging to those who have been maimed or killed. He is on guard, also, to see that the property of the passengers and the company is not damaged or stolen by the crowds that flock to the scene

Protecting the Passenger.

The special agent travels over the line day after day to protect the traveling public from the depredations of card-sharps, pickpockets, and confidence men. This requires ability of the highest order. That the great railroads of America are so free from these swindlers is due to the incessant vigilance of these obscure employees. The man who is first called to protect the railway's property and the lives of its men in the event of a riot or other disorder is the special agent. Many agents have sacrificed their lives in doing their duty

If a train has been robbed by hold-up men, or if it has been wrecked by them for the same purpose, as happens now and then, the special agent buckles on his gun, mounts a horse, and plunges into an unknown country in pursuit of the desperadoes. He does not wait for the sheriff's posse; he does not delay until he has a companion by his side—he rides alone, if necessary, and follows the trail unmindful of ambush or of a battle single-handed with a dozen desperate men.

Less spectacular, but no less dangerous, is the special agent's work in guarding the company's property against the car thieves who prowl by night in the yards of the great freight terminals. They are cowards, but when cornered or caught, they will exchange shot for shot in trying to escape

Still another class is the person who

has what alienists call "a homicidal tendency." Such a man apparently may be a good citizen at home or in contact with his fellows, but for one reason or another he may steal away, place an obstruction on the track, and wreck a train. Some of these men do this only because of a morbid desire to witness the disaster.

Others will pile ties on the track and then signal the train in time to prevent an accident, seemingly wishing to be acclaimed heroes and rewarded. Still others will stand behind a tree or a wall and shoot at a passenger-train as it rushes past, regardless of whom they may kill. The special agent may have to hide for days in an unhealthy swamp to catch his man.

The agent must be an expert in recovering stolen property from pawnshops and at the same time retain the good-will of their proprietors. He must know how to handle juvenile offenders—boys who endanger life and property ignorantly and without thought of malice. He must see that these boys are taught such a lesson that they will not repeat the offense, and yet do so without unduly displeasing their parents. He must preserve the best of relations between his department and all the other departments of the railroad. He must maintain a helpful cooperation between his department and the local police departments on his division.

No Pay for Overtime.

The special agent must be ready on the instant to jump into the breach for any duty, no matter how delicate or dangerous. He receives no pay for overtime. Frequently he will work twenty-four or forty-eight hours at a stretch. When his life is in danger he must see that in protecting it he does not involve his company in a civil suit. His investigations and his conduct must be so guarded that his company is protected from damage suits.

The wages of the average special agent are not large. There is no fixed scale among the various railroads. As a rule, the salaries of the rank and file of the department do not receive more than $100 a month. The salaries of the heads and assistants vary with each road. Some receive as little as $125 a month; others draw double that sum.

Each road organizes its special agents' department in its own way. There is no standardization in the methods of the service. Local conditions vary, and the object is, with every chief, to see that he and his men deliver the goods.

Some of the roads operate an agents', or detective department, and a police department. While these may be under one head, each is separate and distinct. Other lines have only a detective department. The titles of the heads of

T. B. GRIFFIN, WHO RUNS CRIMINALS TO EARTH FOR THE QUEEN AND CRESCENT ROUTE.

Photograph by Young Somerset.

these organizations differ materially; for instance, chief special officer, chief special agent, chief investigator, chief detective, patrolman in chief, chief inspector, inspector of special service, line inspector, traveling officer, superintendent of police, director of special service.

The branches of the work vary according to the management or extent of the railroad system. Some lines devote the department to patrol work exclusively. In others the special agents are employed solely by the legal department In others they are a part of the financial department. Some roads place them under the direct control of the president or the general manager, with the division chiefs under the immediate orders of the division superintendent

In a word, it is the rule to specialize the services of the police and detective force on some roads, and on others the special agents' department is subject to the call of any department of the road that may require its services. This is probably the more general custom.

In a large staff of this sort there are many classes of specialists. Several men may make a special study of protecting property in freight-cars; another group may specialize on crimes against railroad property in general; still another may be experts in the protection of railroad freight terminals, and so on. The idea is, with a large staff, to be able to detail to any department, on an instant's notice, one or more men thoroughly familiar with the work of that department.

For a young man who finds himself fitted for the work of special agent the field offers a good opportunity to become thoroughly familiar with the details of the department in which he specializes. More than one special agent has passed from the ranks of the detective department to the freight, passenger, legal, or other division of the service and has risen high, owing largely to the knowledge he gained in the "preparatory school," as the special agent's department might be called.

Weeding Out the "Card Sharps."

No one knows what railroad was the first to have its own staff of trained investigators and police. In the early days of railroading the transportation lines found that they suffered large losses of goods from the depredations of car thieves. To stop them was the first step. The next evil was the prevalence of swindlers who made a business of "working" the passenger-trains and the stations by means of card-sharping and confidence games. To weed out such men required a higher order of detective ability.

Finally the detective became an adjunct or an aide to every department. Some years ago the International Association of Railway Special Agents and Police was organized To-day this body of men, with a membership of more than four hundred, comprising chiefs and subordinates of the railway detective departments of most of the railroads in this country and Canada, as well as some of those of European lines, is as powerful a deterrent against evildoers as the American Bankers' Association or the American Jewelers' Association. The Interna-

W. C. PENNELL, THE CHIEF SLEUTH OF THE B. AND O. SYSTEM

Photograph by Trainor, Baltimore, Md.

tional Association of Railway Special Agents and Police hold annual conventions, at which are discussed the various phases of the work and various plans for systematizing the work are adopted.

One of the most difficult tasks of the special agents was the elimination of the card-sharps that infested the railway trains. A lot of persons, then and now, like to while away the hours of travel by playing cards. The special agent had to be absolutely sure he was right before he could take any action. The man who allowed himself to be drawn into a game of cards for money with strangers always resented the imputation that he was a victim to a professional. He usually protested against any interference of the railroad detective. Seldom would a passenger appear against a card-sharp if one was arrested.

W. S. CAIN, CHIEF SLEUTH OF THE CHICAGO AND ALTON.

Photograph by Morrison, Chicago.

Month after month the railroad "specials" traveled to and fro, familiarizing themselves with the faces and the methods of the crooked card-players. In most cases they actually engaged in card games with them. Finally, when all the evidence was ready and the cases complete, they swooped down on the sharpers. It was a remarkable clean-up and extended, almost simultaneously, over every railroad from one end of the country to the other.

The harvest was particularly heavy on the Western roads, where the gamblers traveled in groups of four. It was exciting work, but the trains were cleared and have remained so ever since. Ticket-agents all over the country were made familiar with the photographs of the card-sharps. When one applied for a ticket he was likely to be informed that they were "all out," and his attention would be called to his photograph on file. Then, if the gambler made too much noise, the local police would take him in hand.

If by chance he got aboard the train he was likely to be "ditched" by the first railroad special that saw him. He would be ejected at the first stop, after his ticket had been taken and the value of the unused portion refunded to him. A case of a passenger being cheated by a card-sharp on a train is rare nowadays, except, perhaps, on some of the Southern lines, where the campaign was waged less actively. The elimination of the confidence man was a delicate task. Another branch of the work of the railway special about which little is known is the protection of guileless girls and women from the schemes of men who seek to entrap them.

Such things as these, however, important as they are for the protection of the traveling public, are of less consequence than grave crimes against railroad property, some of which cause loss of life. Taking these crimes in the order of their enormity, they fall into four classes: train wrecking, train robberies, car robberies, and robberies at freight and transfer houses.

Methods of Train-Wreckers.

Train wrecking is a most diabolical crime. The ordinary murderer may take one or two lives, but the train-wrecker may gloat over scores of injured and the destruction of thousands of dollars' worth of property. There are four general methods of wrecking trains, according to the classification of the As-

P. J. KINDELON, CHIEF OF THE SPECIAL AGENTS OF THE SOUTHERN PACIFIC RAILROAD

Photograph by Bushnell, San Francisco.

sociation of Special Agents: by obstructions placed on tracks, by tampering with tracks, by tampering with signals, and by tampering with switches.

The obstruction that is generally placed on a track is a tie or rail, one end of which is fastened securely, while the other projects so that it will be struck endwise or at such an angle as to tear up a portion of the track and derail the engine. Tracks are tampered with most frequently by removing bolts from a joint or a crossover, by taking out spikes so that the track will spread.

Signals are tampered with in different ways, such as removing a lamp, cutting the wires by which the signals are manipulated, or otherwise damaging the apparatus. Switches are loosened or disconnected, the locks are broken, they are partly thrown so that the train will do the rest, or thrown entirely so that the train will run off on a spur or siding.

Two classes of people are guilty of these crimes: the intensely malicious and the ignorant or idiotic. Curious as the case is, more than once a trespasser has stumbled over a plank lying beside the track and in a fit of anger has picked it up and tossed it one side so that it lay on the rail in such a manner that it would have caused an accident if it had not been discovered in time.

Much of the agent's work consists of tracing shipments that have disappeared. Presumably stolen, it is often found later that they have gone astray through error or oversight of the shipper or of some one in the freight-office.

Valuable merchandise, in twenty-seven cases, were delivered for shipment from Parker to Amboy, Illinois. When the agent at the point of origin saw the goods on the wagon he remarked to the driver that the cases were not marked. The truckman said he would mark the boxes properly, and returned, saying that he had done so. The agent did not verify his statement, and on the arrival of the goods at destination the shipment checked two boxes short. A claim for several hundred dollars was presented by the shipper. It was found that two unmarked boxes had been transferred to another road

The Hold-Up of No. 10.

The Southern Pacific's China and Japan fast mail, known as No. 10, was held up by two train-robbers within a few minutes of midnight April 16, 1910, one mile west of Goodyear station, California.

The two robbers, who turned out to be J. C. Brown, of Texas, and Charles Dunbar, of Connecticut, boarded the blind baggage just as the train was pulling out of Benicia. Strapped to the wrist of each hand was a revolver. They were dressed in khaki suits and wore slouch hats and black masks. They crawled over the tender and covered the engineer and fireman with their guns, overpowered the engineer and fireman, and stopped the train

Brown had a sackful of dynamite. He climbed down on one side of the train, taking the engineer with him, and Dunbar jumped to the ground on the other side with the muzzle of his gun in the back of the fireman. The robbers ordered the mail-clerks to throw out the sacks or they would blow the train to smithereens. The clerks responded by throwing out the second-class mail.

Brown observed this, told them that the dynamite was capped, and demanded the registered mail. Ten sacks of registered mail were tossed out. Brown then ordered the mail-clerks and the engineer to put the sacks aboard the engine, which they did.

On the other side of the train Dunbar had been shooting along the train to keep the passengers and crew inside. One of the brakemen futilely answered his fire.

When the sacks were aboard the engine the cars were cut off, Brown and Dunbar got aboard and, with Brown at the throttle, the engine leaped away into the night. When Goodyear bridge was reached they stopped the engine, threw off the sacks, and then, opening wide the throttle, they swung off.

An operator at a way-station saw it dash by and sent a message after it. The conductor of the train waiting at Tolenas, twelve miles away, for No. 10 to pass, received the warning in time. He opened a switch and the wild engine was stopped after wrecking two freight-cars and smashing its own pilot.

Meanwhile the robbers had made their escape. As they rowed across the Sacramento River they rifled the sacks. It was an insignificant haul for such hard and dangerous work, seventeen dollars in money, a silver knife and spoon, and a money-order for a few dollars. They landed, stole a horse and buggy, and disappeared in the direction of Los Angeles.

The only material clues were found near the scene of the robbery. They consisted of forty-one sticks of dynamite, a sawed-off shotgun, and a revolver. They also discovered in an old shack in the adjacent hills some underclothing on which the laundry marks were decipherable.

The first wires after the hold-up were to Chief Special Agent Patrick J. Kindelon, of the Southern Pacific Company, and his assistant, J. J. Harrold, in San Francisco. Within two hours after the robbery they were on the way to Goodyear by special train, accompanied by Special Agents Mahoney, Wines, Madden, Coturri, and Kelley. They reached the spot just about daybreak, and with the sheriffs of Contra Costa and Solano counties, the men began a systematic search.

Kelley traced the underclothes to laundries in Southern California. Chief Kindelon found that the shotgun had been sold by a firm in Los Angeles. Kelley traced the gun further and found that it had been shipped to a retailer in Riverside, California. At the retailer's he ascertained that about three weeks before the hold-up had occurred thieves had broken into the place and had carried off the shotgun and four revolvers. The robbers had been seen, and their general description tallied with that given by the enginemen.

Almost simultaneously with the gathering of this information a post-office at Armade, Riverside County, California, was robbed. The men were seen, and the description answered that of the train-robbers. Kelley felt that the trail was growing warm. He learned that the robbers had started northward and followed them without a moment's delay. Here and there he picked up a clue, sometimes good and sometimes valueless. In the neighborhood of Sacramento the robbers stole a horse and wagon. They were caught and arrested by a local constable after a rather desperate struggle. He had no idea that they were train-robbers. He thought they were ordinary hoboes, and as such they were landed in the county jail to serve out a short sentence.

Special Agents Mullen and Eicke heard of the arrest of the two. They proceeded immediately to the jail and found that the numbers of the guns taken from the prisoners corresponded with the numbers on the weapons stolen from the Riverside retailer, and that, with the armament found at the scene of the hold-up, the list of the stolen guns was complete.

Kindelon was notified at once, and the prisoners were taken to Fairfield, Solano County, and locked up on July 16, exactly three months after the fast mail had been robbed. Harrold, Kindelon's assistant, was summoned, and, picking Brown as the weaker of the two bandits, "sweated" him for four hours. Brown confessed, not only to the train robbery, the post-office robbery, and the other known thefts, but to many others that had been mysteries. Both men pleaded guilty and were sentenced to serve forty-five years at hard labor in State's prison.

BLUFFING AT THE BORDER LINE.

The Quaint Town of Vanceboro, Maine, Where the Customs Officers Don't Care How Long They Delay a Train in Order to Rummage Through Your Baggage.

BY SAM E. CONNOR.

TO the government the custom-house at Vanceboro, Maine, is an important necessity; to the railroad it is more or less of a darned nuisance. Annually it brings to the Treasury Department at Washington about $400,000; to the train-despatchers of the Maine Central and Canadian Pacific it brings headache and worry. Under such conditions it isn't very difficult to understand why the United States officials and the railroaders clash in their opinions regarding the value and necessity of a certain small, red-colored frame building in the yard at Vanceboro.

But the railroaders may swear to their heart's content; they may wish the little red building at the other end of the world, yet it will remain a thorn in their flesh so long as New Brunswick and Maine continue to be units of two different nations. Such is the insistence of the Revenue Department of the United States.

Vanceboro is the jumping in place of this great nation, so far as the maritime provinces of the Dominion of Canada are concerned.

Vanceboro numbers only four hundred persons as its permanent population, while the size of its floating population depends entirely upon the amount of business being done over the railroads. Without the railroad Vanceboro wouldn't amount to shucks, for it would be so far from anywhere that no business could flourish. With the railroad there it is different.

It is a hundred miles from the sea, yet its yearly customs receipts are greater than those of Portland, Maine, with a population of more than 60,000 and half a dozen transatlantic steamship lines.

There is a reason. Practically every pound of merchandise landed at Portland is consigned to some point on the Grand Trunk, Canada, east or west. Scarcely a ton of it remains in Portland, or goes to any other part of the United States. At Vanceboro this is different. It is a port of entry—though many miles from the sea—just as Portland.

It is in Vanceboro that practically all the provincial goods shipped into the United States enter the country. In addition to this, as great an amount of foreign merchandise consigned to points in Canada passes through Vanceboro as is received at Portland, because all of the Canadian freight shipped from the old country *via* the Canadian Pacific lines is landed at St. John, New Brunswick, and goes west *via* the Maine Central and the big transcontinental Canadian road's Maine division.

It is not only the imports which cause trouble and discomfort for the railroad workers. Every car-load of through C. P. R. freight which passes through Vanceboro must be looked over by the customs officials. It does not matter if there are fifty cars in a train, each car must be examined for dutiable freight. When the inspection has ended the customs officials seal it up.

At the point where the car leaves Maine and again enters the domain of King George these seals are once more

inspected by customs officials. A seal which has been broken or in the slightest degree tampered with starts an investigation.

Inspecting seals is one of the great troubles of the railroad men at this point. It can knock the schedule of the entire eastern division of the road out of gear in a few moments. Even the most cursory examination is a large time consumer.

But the inspectors are not in the habit of making this sort of an examination. Usually they are very complete in their work. Nothing is overlooked by them. They work with a painstaking thoroughness that uses up time.

A very important building in the Vanceboro yards is the freight detention shed. Every car of freight, other than lumber, is switched beside this shed. Its contents are wheeled into the building, where they are carefully gone over by the inspectors, reloaded into the car, the car sealed by the customs officials, and then it may proceed on its way. This requires a great amount of time, labor, and expense.

Both the examination of the through Canadian freight and that which comes under the head of imports makes bother and trouble for the employees of the road as well as trouble and expense for the company.

The government does not pay for the freight-detention shed; the railroad must provide it. The company is obliged to pay the expense of unloading and loading the cars at this shed as well as the cost of the necessary switching. The government pays the inspectors.

The passenger-service is also turned topsyturvy, and the result is not infrequently felt as far away as New York.

A fifteen or thirty minute delay at Vanceboro may stretch into an hour or two at Boston and still later at New York, so far as mail and express and passengers are concerned. This does not disturb the government, neither does it hurry the inspectors.

Each day in the year from two hun-

YOUR TRUNKS ARE TAKEN OUT OF THE CARS AND SCATTERED OVER THE TURF WHILE THEIR CONTENTS GET A RIGID OVERHAULING BY THE NIMBLE-FINGERED OFFICIALS

dred to a thousand persons come into the United States from Canada at Vanceboro. The baggage of each person has to be examined by the customs inspectors at that point.

In order to facilitate the work, a couple of the inspectors meet all C. P. R. trains at a point twenty miles east of Vanceboro and examine as much of the baggage as possible before the boundary is crossed.

Sometimes, if the travel is light, they get through it all. This is not frequent.

At Vanceboro all unexamined baggage is unloaded. In the passenger-coaches this announcement is made: "All out for baggage inspection!"

The owner of each trunk, grip, or parcel is obliged to open it that the officers may inspect the contents. Some object. They tell the inspectors there is nothing of consequence in the trunk, but the customs men belong to the family of Doubting Thomases. They have to be shown.

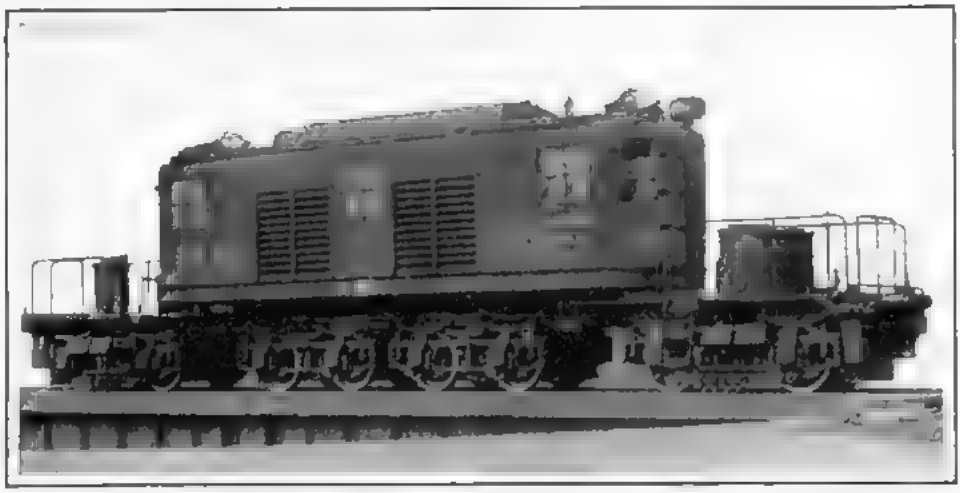
On the days when travel is heavy, when there are two or three hundred pieces of baggage to be examined, the scene around the station is decidedly animated.

Up in the cab the engineer sits and waits and grumbles, for the rules of the road forbid making up more than ten minutes in the 114-mile run to Bangor, which is the end of his division. On the platform, watch in hand, pacing impatiently back and forward, is the conductor.

EVERY PASSENGER IS EXPECTED TO OPEN HIS OR HER TRUNK AND ASSIST THE CUSTOMS INSPECTOR AS MUCH AS POSSIBLE IN LOCATING CONTRABAND ARTICLES.

Each protest means a greater loss of time in getting away. He can do nothing to save time. The government won't work any faster. A conductor can only keep his eye on his watch until he gets word from the chief inspector that the baggage is all O. K., then, as the last piece goes through the baggage-car door, give the high-ball.

A feature of this inspection which is appreciated by trainmen is that their tardiness can be explained by the message: "Delayed by customs inspectors at Vanceboro." The explanation goes.



IN REGULAR SERVICE THIS LOCOMOTIVE HAS A CAPACITY FOR DEVELOPING 1,400 HORSE-POWER CONTINUOUSLY AND CAN DEVELOP AS HIGH AS 5,000 HORSE POWER FOR SHORT PERIODS. COMPARED WITH EXISTING TYPES OF ELECTRIC LOCOMOTIVES, THE 3247 HAS GREATER CAPACITY AND HIGHER EFFICIENCY THAN ANY OTHER HIGH-SPEED ELECTRIC LOCOMOTIVE EVER CONSTRUCTED

GIANT ELECTRIC LOCOMOTIVES PULL ONE-THOUSAND-TON TRAINS AT SIXTY MILES AN HOUR.

BY GEORGE W. DEAL.

TEN electric passenger locomotives of the most powerful type ever built are to be placed in commission by the New York Central and Hudson River Railroad Company out of New York City. A very exhaustive series of tests and trial runs of an experimental locomotive of this type was recently made on the Harlem division. This locomotive was immediately put in service on the electrified section of the New York terminal and a contract was awarded the General Electric Company for nine additional locomotives of the same design.

The electric locomotives in service in the terminal previous to the introduction of the new engine weigh approximately 115 tons. While the new locomotives are considerably lighter, weighing 100 tons, they are much more powerful and are provided with ample forced air ventilation and designed for continuous high-speed service. All their weight is carried on motor-driven axles, while the old locomotives have but seventy tons weight on the driving-wheels.

The new electric engines will exert sufficient tractive-effort to haul a train weighing a thousand tons at sixty miles an hour. In regular service they have a capacity for developing 1,400 horse-power continuously and can develop as high as 5,000 horse-power for short periods. Compared with existing types of electric locomotives, an engine like 3247 has greater capacity and higher efficiency than any other high-speed electric locomotive ever constructed.

Its total weight on drivers and "dead" weight is less than that of its nearest competitor.

The development of the New York

Central's latest type of 600-volt, direct-current electric locomotive is a notable achievement in designing skill. The original New York Central electric locomotives had guiding wheels in the form of a pony-truck, with 28,000 pounds on the axle. There were four driving-wheels, each carrying the armature of a direct current, bipolar, gearless motor.

To improve the riding qualities of this pioneer express electric locomotive, a guiding bogie-truck having two axles was substituted for the pony-truck. A further development in a subsequent type was to increase the distance between the guiding-trucks and the rigid wheel-base

New York Central Operates 47 Electrics.

The riding qualities were improved—but at a loss in the mechanical efficiency—for about forty tons of surplus weight had been added and were being carried by the bogie-trucks for the sole purpose of guiding the locomotive.

The addition of motors to the bogie-trucks and the elimination of this ineffective weight was the next step, so that every pound of the locomotive weight would be instrumental in producing adhesion and tractive-effort. A still greater separation of the fixed wheel-base and the guiding-trucks lengthened the machine so as to necessitate constructing the running-gear in two halves with a spring-connected articulated joint between the frames.

At the present time the New York Central is operating forty-seven electric locomotives in the New York terminal service. Of these, thirty-five were built in 1906 and twelve in 1908. They are all of the 115-ton, 4-8-4 type, equipped with four bipolar, gearless motors. The 3247 is also a bipolar, gearless design, but it is equipped with eight motors, its wheel-base is 4-4-4-4.

Each motor is approximately three-fourths the capacity of the motor used on the earlier engines, making the aggregate capacity of the motors approximately fifty per cent greater than before and affording approximately twenty-five per cent higher speed.

The cab containing the engineer's compartment and the room for the operating mechanism is swung between the two parts of the frame on the center pins.

Each section is equipped with two two-axle trucks having a driving-motor mounted on each axle. These cannot be distinguished as main driving or leading-trucks, as all the axles are driving-axles, but they are termed for clearness rigid-trucks and swivel-trucks respectively.

The rigid-truck is built up of heavy steel castings, the side frames being of a truss pattern, with heavy top and bottom members and pedestal tie-bars.

The end frames and center cross-frames are steel castings securely bolted to the side frames and supporting the magnet poles. The magnetic circuit of each truck consists of the armatures mounted on the axles, the magnet poles carried on the end frames, the side frames and an additional magnet bar form a path in parallel with the side frames.

The whole weight of the truck is carried on semielliptic and coil springs resting on the journal-boxes and equalized together.

The main frame, or backbone, of the locomotive is a box girder built of ten-inch channels with quarter-inch top and bottom plates. It is approximately ten inches deep by thirty-six inches in width and twenty-two feet in length.

The frame is bolted to the top member of the rigid truck and extends forward over the center plate of the leading-truck and backward to the heavy hinge which connects the two halves of the frame.

Hollow Center-Pins for Air Passages.

The main frame carries in its top plate the center-pin which supports the weight of the operating cab. All these center-pins are hollow and serve as air passages, the main box-girder frame acting as a distributing reservoir for the air delivered from the blower in the upper cab through the center-pins and conducting it to the eight motors below.

The construction of the swivel, or leading-truck, is similar to that of the rigid-truck, except that it carries a center-pin and is connected to the main frame through this center-pin instead of being bolted to it rigidly.

This type of design affords a long,

flexible wheel base with eight axles, but restricts the length of any rigid portion to not more than six feet six inches. All the axles are equipped with motors, but the magnetic circuit for each truck or pair of motors is self-contained and relates only to the two axles in that truck.

The cab, carried on the two centerpins as stated, has its weight distributed between the two halves of the locomotive frame. It is the box type, thirty-five feet in length and ten feet wide.

The interior is divided into three sections. The motorman's compartment is located at either end and contains the motorman's seat, controller, air-brake, valves, bell and whistle-rope handles, and such parts of the control apparatus that must be within reach of the operating engineer.

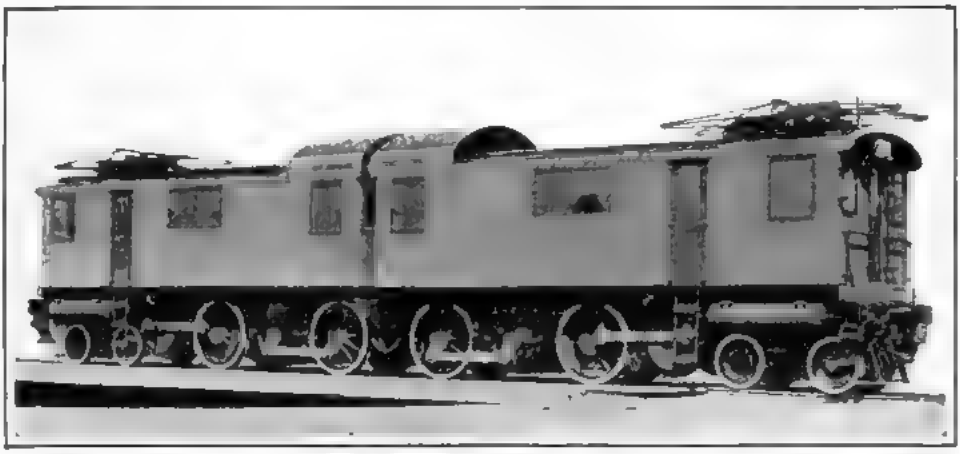
In the central section of the cab are the air-compressors, blowers, contactors, and rheostats, grouped so that they are conveniently accessible for inspection and repair, and separated from the direct reach or attention of the operating engineer.

The advantage of this arrangement is that it removes from the sight of the engineer running apparatus which might serve to distract his attention from the actual work of handling the locomotive and which can be inspected and attended to by his assistant. This general type of construction leaves a fairly long platform on either end of the locomotive. The cab is entered through doors opening onto the platform

The principal data and important dimensions are as follows

Length inside of knuckles	55 ft 2 in
Length over cab	33 ft
Height over cab	12 ft 8 in
Height with trolley down	14 ft. 6 in
Height with trolley running	15 ft. 1 in
Width over all	10 ft
Total wheel-base	45 ft 7 in
Rigid wheel-base	5 ft. and 6 ft. 6 in
Total weight	200,000 pounds
Weight per axle	25,000 pounds
Dead weight per axle	6,395 pounds

Taking up the specific features of the electrical equipment, the eight GE-80



ELECTRIC ENGINE FOR USE IN HEAVY FREIGHT SERVICE. EACH OF THE FOUR PAIRS OF DRIVERS IS OPERATED BY A SEPARATE MOTOR.

bipolar, gearless motors used in these engines each have the armature mounted directly on the axle. The field-poles are carried on the truck-frame which forms the magnetic circuit. There are four independent magnetic circuits in the locomotive corresponding to the four trucks. The magnetic flux path on each truck passes in series through the fields and armature of one motor, through the center transom and the fields and armature of the second motor to the end frame, and then returns to the starting-point through the two side frames and a reenforcing magnet-bar lying parallel with the frames.

The motor is practically enclosed, and the field coils are waterproofed and armored. Each field coil is wound in a brass shell, the windings being in two

decks of flat ribbon-copper laid side by side. The outside turn is covered with insulation and an armor of sheet steel is clamped over it, filling the space between the sides of the shell in such a way as to protect the windings from water or mechanical injury.

End shields are provided for each motor, rendering it dust-tight and as nearly water-tight as is possible in any motor designed with necessary outlets for forced ventilation

Each motor at its one-hour rating has a capacity of 325 amperes on 600 volts, or a continuous rating of 260 amperes on 600 volts under forced ventilation. For the complete equipment of eight motors, this corresponds to a capacity of 13,500 pounds tractive-effort at 54 miles per hour for the one-hour rating, and 10,000 pounds tractive-effort at 60 miles per hour continuously.

Protection Against Short Circuits.

The motors are electrically connected permanently in parallel pairs, and the pairs can be connected in three combinations *-viz:* series, series-parallel, and parallel. They are insulated for 1,200 volts, so that if at any future time it should be desired to operate the locomotive on 1,200 volts the pairs of motors could be changed from parallel to series connections and the same speeds and control combinations obtained as on 600 volts.

The control equipment on the locomotive is the Sprague-General Electric Type M, and is designed to operate the eight motors connected in the three combinations: series, series-parallel, and parallel.

The external regulating resistance, divided into four parts, is directly connected, each part to a pair of motors permanently grouped in parallel. The pairs of motors, with their respective resistances, are connected all in series on the first point on the controller.

The resistance is varied through eight points on the controller and finally short-circuited on the ninth, or running, point The pairs are then operated similarly in series-parallel with all resistance cut out on the seventeenth point. Finally all the pairs are connected in parallel with the twenty-fourth step a running point. This provides a control with nine steps series, eight steps series-parallel, and seven steps parallel.

The transition between series and series-parallel is effected without opening the motor-circuit, and there is no appreciable reduction in tractive-effort during the change. The smooth transition between points, both rheostatic and transitional, permits motor operation close to the slipping point of the wheels

The locomotive weight on the drivers is so proportioned that the motors operate safely up to the slipping point, which serves as a limit to prevent overloading the motors. The transition between all four pairs of motors in series to series-parallel is accomplished by short-circuiting two of the pairs of motors during the instant of transfer. The transition between series-parallel and parallel is effected by means of the standard bridge method.

The motor cutout switches are connected so that any pair of motors may be cut out of circuit. The locomotive will operate when a pair of motors is cut out with two groupings of the motors, the first with two pairs of motors in series and the second with three pairs of motors in parallel.

The protection of the locomotive against short circuits is very complete. All main fuse-boxes are of the copper-ribbon type, fitted with hinged covers to facilitate fuse renewals. The box is provided with a very effective magnetic blow-out, which is energized by the current passing through the fuse.

Cabs Are Heated by Electricity.

The main fuse-boxes are located as near as possible to the overhead trolley and to the third-rail shoes in order to protect the wiring circuits near the source of supply.

Each pair of motors is locally protected by a fuse-box. The main switch is provided with a blow-out so that heavy currents can be opened without damage.

An ammeter is located at each engineer's position and records the current in the circuit of one pair of motors. The ammeter and air-gages are illuminated by a gage light connected in the headlight circuit, so that the headlight switch turns on simultaneously the headlight

and the gage light at the same end of the locomotive.

The main-motor rheostats are formed of cast-iron grids mounted in a frame and insulated in mica. The rheostat-boxes are assembled in the monitor deck of the locomotive.

Current is collected by eight under-running third-rail shoes or by two overhead trolleys for running on gaps on the third rail. The overhead trolleys are the pantograph type and are pneumatically operated. They can be put into service from either engineer's position by a foot-operated valve. The trolley is designed for intermittent use and is therefore arranged to be held in a raised position only while the valve is held open by the engineer's foot.

The headlights are the incandescent type, with parabolic reflectors sixteen inches in diameter. The interior illumination of the cab is provided by ten incandescent lamps arranged in two circuits, two lamps being located in each engineer's cab and the balance in the central compartment.

In each lamp circuit is a portable lamp with extension cord twenty-five feet long. One lamp switch is located in each engineer's compartment, so that from either end of the locomotive the lamps can be controlled in that compartment as well as half of the lamps in the central compartment.

Electric heaters are placed in the two engineer's compartments. The heaters are a standard electric-car type, fitted with heavy outside covers to protect them from the mechanical injuries to which they are exposed in locomotives.

The blower set provided for ventilating the driving motors is located in the central compartment. The blower has a capacity of 24,000 cubic feet of air per minute and is driven by a series-wound motor of the railway type.

The air-compressor is a two-stage motor-driven compressor with a piston displacement of 100 cubic feet of air a minute when pumping against a tank-pressure of 135 pounds a square inch.

The air is taken from the interior of the central compartment through a screen, which prevents the entrance of particles of dust. The compressed air in passing from the low-pressure to the high-pressure cylinder is conducted through radiating pipes under the platform of the main cab. This reduces the temperature of the air and allows condensation of moisture before entering the high-pressure cylinder.

From the high-pressure cylinder it is delivered into a series of air reservoirs. There are four of these, each 16 x 90 inches, located under the floor of the cab and connected in series, which provides a further opportunity for radiation and condensation.

HE WOULDN'T PAY THE FREIGHT.

HE entered the station at Webster and, approaching the window, asked:

"Has a car of lumber arrived for O. A. Jones yet?"

"Yes, sir," replied the agent, "it arrived this morning"

"What's the freight on it?" he asked.

The agent told him that it amounted to twenty dollars. He almost fell backward when he heard the amount

"Twenty dollars!" he repeated. "Why, it's outrageous. It's highway robbery! I won't pay it. What's this road trying to run—a get-rich-quick system? I'm going out and unload that car! When you get ready to make me a reasonable price, I'll pay it, and not before! I won't pay no twenty dollars!"

"Don't you touch that lumber!" shouted the agent

"I'm going out and unload it, I tell you!" he exclaimed

"If you do, I'll have you arrested," the agent retorted.

"Oh, you will, hey? What do you suppose I care for the law? I've got money enough to buy this whole pike! I want that lumber, and I'm going to get it, and I won't pay twenty dollars for it either! I'll take this matter up with the president, who is a personal friend of mine, and have you fired!"

Then he walked away

The agent watched him as he hustled up the road. The lumber remained where it was for a week. He had taken it up with the consignor, who guaranteed to pay half the freight; but at the end of the week, when he came and paid his twenty dollars, he paid four dollars extra for car service

Once more he threatened to have the agent fired, but the agent never before took in money for the company with more pleasure than he did on that occasion.

SCIENCE MADE SIMPLE.

BY C. H. CLAUDY,

Author of "How Wireless Works," "How the Parts of a Locomotive Coordinate," etc., etc.

An Up-to-Date Record and a Discussion of the Latest and Most Important Events in the World of Science, Written so as to Be Easy to Understand.

ARE YOU COLOR-BLIND?

Why a Man's Fitness to Be an Engineer, a Fireman or a Brakeman Depends on His Ability to Know and Recognize a Great Variety of Tints.

C. H. CLAUDY

Photograph by Harris & Ewing Washington

"KINDLY sort these bundles of colored yarns and put them in piles according to color."

The examiner tips up a pasteboard box and out tumble dozens of hanks of yarn—red, blue, green, yellow, violet, black, and all possible shades of mixed colors.

"There are several of each color," the examiner continues, "but not an equal number of each color."

The candidate approaches the table and begins to sort. He lays all the reds in one pile, all the greens in another, all the blues in the third, until the lot is sorted. Then he returns to the first collection and separates the reds into four piles, the greens into three piles, the blues into six piles, and so on, accurately matching shade with shade.

He is then required to take a pack of colored cards and name each color as he counts them out. Sometimes he has difficulty in naming the color correctly, but his difficulty is that of unfamiliarity with names, and not because he doesn't know the color. He calls magenta a "wine red," and indigo he terms "a deep blue," but he knows exactly what color each card is. He, and ninety-five other candidates in every hundred examined for color blindness, will pass such an examination.

But the other four in the hundred fare far differently. They approach the table with the same confidence, sort the yarns as easily as do their predecessors, but their sorting is anything but accurate. Some lay dark greens and bright reds together; others cannot distinguish between yellow and green.

Others sort the colors correctly, but cannot distinguish between shades of the same color except between the very lightest and the very darkest. Some who can tell red and green apart in yarns, in sorting the cards call red black, or refer to green as red.

The peculiar part of it is that these young men being examined for engine and train-crew positions are both sur-

prised and indignant when told they are "color blind." Some refuse to believe it and depart in indignation, convinced that they have been unfairly discriminated against. All their lives they have known what green was, yet the card they so confidently call green is really red.

The examiner is sorry, the railroad is sorry, because some of these rejected men are ideal for train-crew positions, healthy, sober, bright, industrious, strong, alert, capable men. But there is nothing else to do but pass them by. When a man cannot distinguish clearly and unmistakably between the red of a danger signal, the green of a caution, and the yellow white of a clear signal, he is not fit to be trusted with any part of a train, whether his destiny is that of engineer or brakeman.

Signaling Is Founded on Color.

Railway signaling is built on color and the recognition of color by train-crews. Some of these rejected candidates will go to physicians and ask to be cured of their peculiar affliction—to be treated so that their eyes will act normally. But the physicians will shake their heads regretfully. There is no known cure for color blindness any more than there is any known cure for tone deafness, that peculiar inability to recognize one musical tune from another or tell a high note from one lower in the scale.

The tone deaf and the color blind have had something omitted from their hearing and their visual apparatus—something, somewhere, is lacking. Science, not only unable to put it in place, cannot even say with certainty just what it is that is missing.

There are many theories to account for this color blindness, but none of them are final. All we know is that the color-blind eye, perfect as regards vision of form, of distance, and of quantity of light, cannot recognize clearly the difference between lights of different wave lengths or colors. It is as if some of the strings of a musical instrument were missing—what are present are perfect and can be played, but those which are absent cannot sound.

In an endeavor to find out the cause and cure of color blindness the physician must go first to the physicist to find out what color really is. And here we come up against a somewhat astonishing fact which many find it difficult to believe. There is not really any such thing as "color." It has no more material existence than has any other sensation.

How Color Is Created.

Sound, for instance, is caused by the vibrations or wave motions of the air, which, impinging on our ear-drums, cause a sensation which our brain recognizes and calls sounds. But a deaf person hears and recognizes no sounds, though they may be all about him.

Color is caused by varying vibrations in the ether. These vibrations we call light. Vibrations of different rapidities, and waves which vary in length, impinging on the retina of our eyes, cause sensations which our brain recognizes and calls different colors. A blind person sees no color, though the light may be all about him.

In a perfectly dark room there is no color. The red rose and its green leaves are exactly alike as far as appearance is concerned. We can feel the difference between leaf *texture* and rose *texture*, but not because they are of different colors. A red and yellow rose, for instance, *feel* the same.

Even in the presence of certain lights color fades from existence. Every one is familiar with the peculiar greenish light which emanates from a Cooper Hewitt mercury tube. So brilliant is the light and so easy to work in that many large manufacturing establishments adopt it to use for night work. The Government Printing-Office at Washington and the Bureau of Engraving and Printing, for instance, illuminate their work-rooms with its pale radiance.

It changes the colors of many things on which it falls. A pretty girl in a red dress seems dressed in black or a dull drab. Her red lips are yellowed, her skin like that of a mummy, and evil-appearing brown patches appear on her face where, in daylight, is the soft blush of health. Neither her dress nor her lips nor her skin have changed merely because she has walked from an arc-lighted room to one in which the Cooper Hewitt

tubes are used, yet the colors which she and the world about her consider an actual part of her person and her clothes are gone.

No Red Rays.

Science is ready with the answer it is simple enough. In the light rays from the Cooper Hewitt tubes are no red rays. Violet, green, yellow, and blue are there, but no red. Consequently those fabrics, those substances of silk or of human flesh, which normally absorb all light rays but red and reflect those red rays back again, are now powerless to affect the eye as usual, because there are no red rays in the light at hand to be reflected back.

But neither red silk nor red lips nor softly blushing cheek reflect *only* red rays. All of them reflect some yellow, some brown, some greenish light, though our eyes do not take account of it because of the preponderance of the red rays. It is like listening to a fog-horn and a slender whistle blown at once—we undoubtedly *hear* the tiny whistle, but we do not *note* it because of the preponderance of the louder sound.

In the case of the red cheeks we do not see the brown and the yellow they reflect because of the preponderance of the red. Extract the red rays from the source of light and all we see then is the yellow and the brown. Our pretty young girl becomes a hag with a face that tells us immediately how much beauty depends on form and how much on color.

Causes of Color-Blindness.

Color, then, exists in nature only in the variations of light rays and the ability of different subjects to absorb, to refract, and to reflect these rays. A race of men totally blind could, perhaps, recognize the difference in different kinds of light by some of their physical effects—the sunburn of the violet light in sunlight, ability of certain kinds of light to alter certain chemicals, *et cetera*, but the men of that blind race would not know shade from shade, nor even certain colors from certain other colors.

The color-blind man is partly in this class. Some lights he can recognize as being of certain colors, others convey to his brain an impression totally different from that they give to you and to me. Color, as we understand it, for him does not exist, hence his indignation when told that he is color blind.

In the world about us everything is either colored or black or white. By the word "black" we understand complete absence of color and by the word "white" a mixture of all colors. That black is total absence of color and not a color in itself, and that white is a mixture of all colors is easily proved by scientific experiment as well as by common experience.

We have only to remember that any color is a sensation in our eyes caused by the vibrations of the ether which we call light to prove the first. Remove the vibrating ether, produce the absence of color, and what we "see" is black. A piece of vivid red velvet, a piece of pure white silk, and a flaring yellow sunflower appear totally different in the light.

Forming the Spectrum.

Put each at the end of a long, closed tube, and the eye, looking down, sees only black. We have cut off the light, removed the source of color, and the absence of color gives that absence of sensation in the eye which we call "black."

Take a round card and paint it in the colors of the rainbow and then whirl that card rapidly upon a spindle. The result is that the card appears a light gray. It would appear pure white if it were possible for us to have perfectly pure colored paints. A more convincing experiment is as follows: Every one knows that when a small beam of sunlight in a darkened room is allowed to fall on a three-sided prism of glass it is broken up into a broad band of colors The reason for this breaking up, this forming of the "spectrum," as science calls it, is that the different kinds of light in sunlight are differently refracted, or bent, when they pass through dense, transparent bodies such as water or glass

The violet light in sunlight, for instance, is the most refracted, and the red the least. The other colors are refracted at various angles. The result is that our beam of sunlight spreads out in

a broad colored band after passing through the prism and is violet at one end and red at the other

After an afternoon storm the rainbow in the eastern sky is but an example of this phenomenon, the prism being millions of minute drops of water in the air which break up or "analyze" the sunlight.

Another familiar effect of this different *refrangibility*, as it is called, of the different kinds of light which make up sunlight, is found in the beautiful red and yellow sunsets. When the sun is setting his rays reach us through a much greater thickness of air then when overhead. This air has in it minute particles of dust and also of water. These, as well as the various strata of air at different pressures and temperature, refract or bend the light rays. The red and yellow are least refracted and bent.

Why the Red Remains.

Consequently, when the other colors are bent or refracted out of the direct beams which reach our eyes, the yellow is next last to go and the red actually the last. This also accounts for that deep red afterglow which is so beautiful when the sun has finally set and only the refracted red rays remain to reach the clouds and be reflected to our eyes.

As it is evident that no light but sunlight is falling on our prism, and only colored lights are coming out the other side, it is evident that the colored lights must have come into the prism in the sunlight. The experiment becomes absolutely conclusive when the colored band, or "spectrum," is allowed to fall on another prism, and, from the other side of that one, out comes the band of white sunlight again the colors recombined to form white light.

Instruments which are used to examine the spectrum of sunlight are called solar spectroscopes. It was speedily found that this experiment was to be one of the great forces of scientific research. Actually, to-day, there is no tool of science which has done more to solve the riddle of the material universe than this same spectroscope and mechanical variations of it in which the prisms are replaced by fine gratings which serve the same purpose.

It was speedily discovered that every material substance, when heated, gave forth a special and never varying light; that this light not only always analyzed the same way in the spectroscope, but that certain dark lines, "Fraunhaufer lines," named after their discoverer, always crossed these spectra at the same places. By these lines and their position astrophysicists have been able to say with the utmost certainty what the composition of the sun may be, what the stars are composed of, and what they are like.

Still more wonderful, the first discovery of a certain elementary substance called helium, from *Helios*, the sun, was made by the spectroscope in examinations of the sun. It was found in this world only *after* it was first found in our source of light, heat, and life some ninety-three million miles away from us.

The wonder of color and the spectroscope does not begin to stop with this little instrument which resolves light into its elements and makes it recount to us its story, telling us of what things are made. We can examine the spectrum of a distant star, for instance, and tell whether it is moving toward us or away from us. The little black lines in the spectrum shift to right and left, according as the source of light is moving one way or the other.

Few railroad men have not noted that as an engine comes toward them, clanging its bell, the note seems to rise in pitch, and that as it goes past them it goes lower in pitch. The sound-waves are seemingly compressed and made more short and rapid when their source is moving toward the hearing ear. They are expanded and made slower when the source of sound is traveling away from the hearing ear.

The more rapid the waves of sound, the more reach our ears per second and the higher the note. The slower the waves, the less reach our ears per second and the lower the note

Its Use in Astronomy.

A similar phenomenon of light is distinguishable in the spectroscope. When that star which is being examined is rushing toward us the lines shift toward

the blue end of the spectrum, because when the distance between us and the star is rapidly decreasing the number of light waves per second received by the spectroscope is increased and their wave length is diminished — made smaller. The greater the number of light waves per second and the less their size, the more they verge toward the violet end of the spectrum.

Yet more wonderful, this color instrument, this affair of tubes and grating or tubes and glass, which has worked so great a revolution in all science, actually tells us not only whether a star approaches us or moves away from us, but how fast it is going.

Of course, to most of us it does not make any difference whether a star so far off is going away from us or coming toward us. But the wonder is there, nevertheless. Our intelligence has taken from color and its causes a totally new meaning, and by means of instruments which deal with light and with color we can read at least a part of the great riddle of the heavens.

The isolated fact of one star's approach or going away is of no interest to you or me, but the solution of all the problems of astronomy are vital to the race — which means you and me. It was an astronomer, let it be said, who made possible the navigation of the sea, impossible save as a haphazard venture without astronomical calculations, instruments, and books.

Color Test Is Most Delicate.

Surveying, which precedes the building of any railroad, is built on the science of astronomy, and without it we could never dig a tunnel from both sides of a mountain and have it meet in the middle or calculate a distance greater than our chains could stretch.

It is not only in astronomy and with the spectroscope that color and light analyses are used. The most delicate measuring test known is a color test.

Every one who reads the magazines has seen the advertisements of various makers of photographic lenses of supreme quality. People who do not understand photography are oftentimes led to wonder at the prices—fifty and sixty dollars for a fine lens for an ordinary camera. A really fine photographic lens is so carefully made and to such exact measurements as to be in itself a very costly proposition.

Without going into all the processes of manufacture, let it be said that such a lens must be, when finished, of an *exact* curvature. This curvature cannot be approximated or guessed. It cannot be within a thousandth of an inch — the measurement which a gunmaker or a watchmaker considers accurate. It must be more nearly correct than the finest mechanical measuring machine can possibly measure.

It is done by the use of colors of light. The optician first makes a "test glass," which is a block of fine glass, hollowed out to the exact shape and curvature the finished lens is to possess. Its construction is a delicate affair. It means hand polishing and grinding continued over months of tests and labor. When finished these test glasses are as perfect as human ingenuity can make them.

The Colors in Bubbles.

To test the lens, after being ground and polished to the finest possible degree, it is laid in the hollow of the test glass. It is held gently in position. Immediately the lens and the test glass, when looked at in the light, are filled with beautiful colors — that is, if the surface of the lens and the surface of the test glass really fit each other. If they do not fit, no color is seen.

If they fit absolutely, only *one* color is seen, that color depending on the amount of pressure with which the two are held together. But if they fit at one place and not at another, then *several* colors are seen, and by these colors and their shapes can be told where the lens being tested is "high," that is, where it has not been sufficiently ground and polished.

Every one has admired the beautiful colors in a soap bubble. The colors between the two perfectly fitting glasses are caused in the same way — by the diffraction or breaking up of light when passing through an infinitely thin film. In the soap bubble the film is of soap and water. In the test glass it is of air. Variations in the thickness of this air film, caused by pressure of the two

glasses, cause different colors to appear. If the air film is even all through -indicating a perfect fit—the color is uniform through the lens

It may come as somewhat of a shock to many to be told that they are born with a "diffraction grating" about their persons, and that most people carry them through life. Tell the average man that he has a spectroscope about him which he cannot remove without trouble and with which he can see the spectrum of sunlight, and he will laugh at you—but it is true. This spectroscope is the eyelashes.

Colors Created by Light.

All but close the eyes, so that the lashes are touching, and, looking at any bright source of light, you will see, between the eyelashes, a myriad of bright colors. These colors are caused by the breaking up or analysis of light by the minute spaces between the eyelashes. The waves of light, varying from about the one thirty-nine thousandth of an inch in length for the red rays to the one fifty-seven thousandth of an inch for the violet rays, are differently refracted or bent in passing through these narrow spaces, and thus an imperfect but nevertheless brilliant spectrum is seen between the hairs.

Nature is full of such spectroscopic apparatus. The shimmer of an opal or of mother of pearl is due to the surface of those substances being full of minute fissures which diffract and break up the light. The backs of certain beetles display colors which are not formed by any pigment, and the familiar iridescent appearance of a fly's wing is due to the same cause

Other insects, of course, are colored by pigments in the structure of the chitine or horny tissue of their bodies. Pigmentary colors, however, change little or not at all on being turned and moved in the light, while spectroscopic coloring, due to the breaking up of light waves by minute fissures or by reflection, will alter as the angle of the substance is altered toward the source of light.

All this wonder world of color, and all that the true understanding of color means to the scientist, as well as to the railroad man, depends on a phenomenon of our eyes and of light, rather than of a material thing. Light rays really are of different lengths and do vibrate more or less times per second according to their kind, but our recognition of these light rays by the eye is a matter of sense and not of actual existence.

There are light rays far too slow for our eyes to recognize, and there are light rays far too rapid for our eyes to see. We know of them by their effects, but we no longer call them by the names of colors. The one is infra-red — below the red of the spectrum. The other is ultra-violet — beyond the violet end. What magic colors they might show to eyes of other worlds we can but guess. They exist, we know of them, but they are not to us colors.

Only the rays of the spectrum which lie between the violet and red produce a visible effect within our eyes. Only our capacity for recognizing them without recourse to scientific instruments permits us to call them by the familiar names of colors.

So, after all, a man's fitness to be an engineer or a brakeman depends, finally, on his ability to know, recognize, and understand something which, as a thing, has no real and distinct existence

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ICELAND'S FIRST RAILWAY TO BE BUILT.

THE harbor of Reykjavik, Iceland, is to have a railway built about it so as to facilitate the transport of freight and ease the congestion due to old-fashioned methods, according to a report by E. D. Winslow, United States consul general at Copenhagen. The enterprise is small to begin with; but it is thought that once an opening is made on the island a railway running across to Thingvalla will be built The new improvement will cost about $500,000, and will consist of about six miles of track. It will be Iceland's first railway. Two hundred men will be employed, and the first improvement will not be completed before 1916. The work is in the hands of N. C. Monberg Company, of Copenhagen, which has already shipped two locomotives, a dredging machine, and other material to the island.

WILLIAM BRADY, M.D.

DON'T BE AFRAID OF FRESH AIR.

BY WILLIAM BRADY, M.D.

It Is a Curious Sort of Reasoning that Attributes a "Cold" to a Draft, When Ninety-Nine Times Out of a Hundred Exposure to a Draft Produces No Ill Effect.

AN engineer who would shut out the draft of his fire-box wouldn't get anywhere. A fire will die out if it doesn't get enough air, and the only way it can get fresh air is by a draft. Give it a good draft, keep the fire-box well filled with coal, watch out for clinkers and slate, and you'll make your time.

A man is an engine. He may be a hog or a high-geared passenger-engine. He may make a lot of noise, puff and blow to beat the deuce whenever he's working, but he is an engine just the same.

Get Acquainted with Ozone.

Give him good fuel, without clinkers and slate, keep his tank well filled with pure water—with nothing on the side—and allow him plenty of air and he'll run on schedule forever. Rarely will the family doctor have him up on the carpet to explain what's the matter or why he was ten minutes late this morning. The well-cared-for engine does its work without much tinkering.

Ever since Dr. Wiley looked over the coal-fields we have been getting pretty high-grade coal for the human engine. As for water, it is the fault of the engine itself if there is anything objectionable about the water. But the air supply is still subject to considerable misunderstanding, and for the good of the service—even though it may imperil the family doctor's income—we have been looking into this matter of air supply.

We've found some curious things which deserve publicity no matter who is hurt by their publication.

The railroad man—of all men—is out in the open air all day, but when he gets home it's a different story.

"Great guns!" he bellows. "Whatcha tryin' to do—freeze the house?"

"Why, no, you silly," rejoins his wife meekly. "That window's been wide open every night this year. What ails you?"

"Well, 'tain't been so cold before! Shut it down! I don't intend to heat all outdoors with coal at seven dollars a ton!"

"Now, Ben, you know what the doctor said—how the children would never get over havin' croup unless we kept our bedrooms aired."

"The doctor be blowed! There's a draft blowin' right on me! Do you want me to get pneumonia or something? Shut it down!"

Not the Way at Home.

Resignedly she complies. Presently Ben is snoring. And presently, too, the little wife creeps softly out of bed to raise the window again. Then she creeps softly back.

Ben sleeps the sleep of the unjust. At ten he yawns and stretches luxuri-

ously. At a quarter before ten the window was lowered once more and the steam turned on. At breakfast the lord lectures his lady on common sense. This fresh air fad is all right, but there's no use exposin' yourself to drafts like that. Why, when he was a kid—

But you've heard him ramble. What didn't happen when he was a boy in the country, what hardships he wasn't exposed to, what insurmountable difficulties he didn't overcome with no friends or help of any kind—never were known. Yes, sure thing, the kids need plenty of fresh air, but don't kill 'em with drafts.

Ben thinks he knows what he's talking about. Now before Ben got a steady run he laughed many a time and oft at the boneheads who then ran the train. Since he made the milk-train—three times out every week—boneheadedness has been conspicuously absent from the train-service, being limited to the despatcher's and the superintendent's office.

However, he has very positive opinions regarding drafts. He thinks he can ventilate his house and exclude drafts. In fact, his old family doctor, his father's old family doctor, or any old family doctor would corroborate that opinion.

Drafts Won't Hurt You.

But nevertheless it is an impossibility—so utterly impossible is it to ventilate a room without admitting fresh air that sanitary engineers by the score have grown gray and nutty in the futile endeavor to accomplish the impossible—just as other simple souls have gone dippy over perpetual motion.

Ventilation—change of air, or exchange of air—implies the movement of air, and if old Noah Webster had had his wits about him when he was writing his one best seller, the movement of air means a draft.

Drafts won't hurt you as long as they cause no actual physical discomfort. Not mental discomfort—grandmotherly unrest, but real physical discomfort—chilliness. If a draft makes you chilly, move out of it or put on extra clothes.

For health's sake don't exclude the draft. Drafts are harbingers of health. Without them we would all die like rats under a vacuum-pump.

A peculiar thing about the salutary effect of a draft is that it seems to make little difference whether the air in the draft is good or bad, provided only that the draft be cold.

Professor Hill found that his experimental subjects remained quite comfortable in their air-tight box so long as he maintained a draft of cool air by means of electric fans. When the fans stopped the men began to grow drowsy, feel headaches, get short of breath, and sick; but on starting the fans again without admitting a particle of fresh air, these symptoms of carbonic acid gas poisoning promptly disappeared.

Thus the draft is more essential to health than is the purity of the air in the room, though, of course, the purer the air, the better.

Succumbed to Their Poisons.

Had there been an electric fan in the Black Hole of Calcutta, the terrible outcome of that inhuman crime might never have been recorded in history. Twenty-three out of the hundred and forty-six men survived the night of incarceration in a room twenty feet square.

The others succumbed to their own poisons—not to the lack of air because there was no draft to carry off the emanations from their skin.

It is a curious sort of reasoning that attributes a "cold" to a draft, when ninety-nine times out of a hundred exposure to a draft produces no ill effect. Stuffiness may temporarily follow sitting in a draft, but it disappears promptly on returning to a warm place. All is not "cold" that snuffles.

Chilliness and chills introduce various respiratory infections such as "head colds," sore throats, bronchitis, pneumonia, and the like. This chilliness, however, is not a cause, as is vulgarly supposed, but an effect—a symptom of a bacterial infection already consummated.

Grippe, erysipelas, blood-poisoning, typhoid fever, malaria, and other diseases have chilliness or chills as a symptom, but no one with intelligence attributes the illness to getting chilled.

Were it not for our medical fondness for "hedging" on the diagnosis, we

would admit frankly and plainly that there is no such thing as "taking cold" from drafts, bad weather, or cold air.

The Worst that Can Happen.

All of our treatment is based on such an admission now, but we like to hang on to the old delusion of "catching cold" because it is the handiest little tool in the diagnostic kit when it comes to patching up a mistaken diagnosis.

What's the trouble? Oh, you've contracted a heavy cold. You'll be all right in a few days. Keep well under the covers.

But in a few days the trouble turns out to be inflammatory "rheumatism." Easy enough: Presto, change! The "cold" has settled in your knees! Or maybe it proves to be typhoid fever? Very well, the "cold" has "turned" to the fever. Or infantile paralysis? Well, you see, my good friend, the spinal trouble "complicates" the cold. Good-by; be sure to telephone me if you get any worse.

No man of ordinary mentality; indeed, no child of normal mental caliber, requires any house-bred sanitary advice about avoiding exposure. Most anybody knows enough to come in out of the cold when the cold becomes uncomfortable. If one can't come in and get warm, the worst that can happen is frostbite.

The old booze-fighter who gets a "load on" and falls asleep on the side of the street in cold weather sometimes does develop pneumonia later on; but if he does, the pneumococcus the pneumonia germ — had got him before he took his nap

His delirium, which led him to expose himself to the winter cold that way, was partly booze and partly delirium of pneumonia.

That chilling alone does not and cannot cause pneumonia has been experimentally and practically proven many times.

Children who paddle about in snow, cold, and water without regard for "taking cold" are the healthiest by far. So long as their loving friends, their playmates, or their fondling elders peddle no "cold" germs among them, the kids will *never* suffer any illness from the weather

If weather is harmless outdoors, it is only common sense to let a little weather in *via* a draft, isn't it?

Suppress the "cold" carrier — the thoughtless person who perpetrates the open-face sneeze on the household and have a good, free draft blowing over your bed all night long all the year round and you'll save half your doctor bills.

THE KID ON THE RIVET-PUNCH.

BY WILLIAM LAIRD.

'WUZ a chipper young kid on the rivet-punch,
A kid with an Irish mug.
He whistled shrill in the shops' dull roar,
An' swore like the men around him swore,
An' chewed his juicy plug

His die wuz loose, his punch struck wrong,
The tough punch snapped an' flew;
A hunk o' tool-steel bit his heart
He give a grunt, an' a twisty start,
Then flopped—an' he wuz through

Through with grease, an' dirt, an' sweat,
An' his wide blue eyes wuz calm
They got the litter outen the shack,
An' took an' kivered him up with black,
An' carried him home to his mom

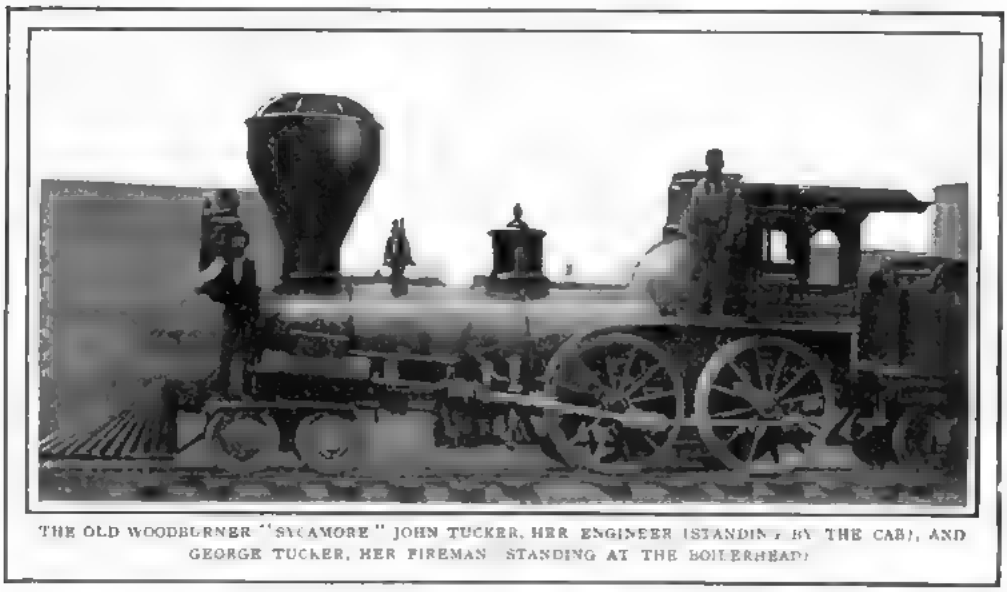
But that's all right: it's got to be
So men kin ride unvexed
Through drought an' storm, through marsh an' gorge—
Brothers at throttle, lathe, or forge,
Whose sacrifice is next?

OLD "SYCAMORE" ONCE SIDE-TRACKED FOR HORSES.

Famous Woodburner, the Only Engine of the Defunct Chicago and Iowa Railroad, Carried 80 and Blew Off at 110.

BY E. B. MEAD.

THIS photograph of the famous old wood-burner "Sycamore" was taken about 1871. Engineer John Tucker, who handled her throttle until she was changed to a coal burner, is standing



THE OLD WOODBURNER "SYCAMORE" JOHN TUCKER, HER ENGINEER (STANDING BY THE CAB), AND GEORGE TUCKER, HER FIREMAN (STANDING AT THE BOILERHEAD)

by the cab. His nephew, George Tucker, the fireman, is standing at the boiler head. George Tucker was an engineer on the Chicago and Iowa Railroad over forty years ago, running freight from Aurora to Joneston. This road is now part of the Chicago, Burlington & Quincy. One winter he was actually snowed in with his locomotive for three days, but he stood by her and managed to keep alive with the heat from the firebox. During this exposure he contracted a severe cold which developed into consumption, from which he died two years later.

The "Sycamore" and one combination coach made up the most important train on the Chicago and Iowa. The combination car carried passengers, mail, baggage, and express. The road did not boast of such a thing as a freight-car. Of course, only packages sufficiently large to be taken aboard the baggage car were carried, and at every station the engineer, fireman, and conductor were obliged to get down and help load and unload.

The road in its early days was four and a half miles long and was known as the Sycamore and Cortland Railroad. It was nicknamed the "Slippery Elm." At one time the old style strip-rails were used, and later the cast-off rails of the Chicago and Northwestern.

At one time in the early life of the road it did not bring in sufficient revenue to pay a profit, so the "Sycamore" and her lone car were taken off and an old Chicago street car, pulled by one horse, was substituted. Finally the neighboring country became more prosperous and the old burner was restored to service.

The "Sycamore" carried from sixty to eighty pounds of steam and blew off at 110. The old engine was always considered a bit dangerous and frequently had to be sent to Chicago to be doctored up.

ON THE CIRCUS SPECIAL.

The Gigantic Task of the Railroads in Transporting Over the Continent Every Year Millions of Dollars Worth of Wild Beasts, Trained Animals, and Freaks, and Hundreds of Performers.

BY HUGH G. WEIR.

IN the dusk of the railroad yards at Parkersburg, West Virginia, a peculiar problem in mathematics had delayed for three hours the strangest train American railroads handle—a train whose eighty-eight cars provide a home for twelve hundred persons and carry a freight valued at one million dollars.

At one end of the train the long, gray tusks and small, muddy eyes of an elephant peered out into the gathering shadows. Somewhat farther along was a series of flat-cars loaded with huge tarpaulin-covered cages from which emerged the chatter of restless monkeys, the mournful wail of a hyena, or the disgusted grunt of a "rhino."

In the train also were series after series of gaunt, canvas-draped "flats," shadowy freight-cars, barred to the prying eye, and finally a seemingly endless row of red-painted coaches whose occupants were clustered on the steps or sauntered about the graveled tracks chattering in a dozen tongues and dialects.

The train is a traveling city which in a little more than a half year covers a zigzagging itinerary of twenty thousand miles. At six points each week, beginning some time in April and continuing until the end of October, it unloads its diverse cargo for the performance of the circus. The modern circus is a great railroad project to whose success the experts of transportation contribute.

The public sees only the glamour and thrill of the tan-bark. It does not see the marvel of organization that makes possible the program that it applauds and which, between midnight and morning, will carry that program to another audience maybe a hundred miles away. In its way the machinery behind the circus performance is quite as wonderful as any of the much-heralded acts on the bill.

I had boarded the Ringling show-train at Chicago on midnight of Sunday. For forty-one hours we had zigzagged at little more than a snail's pace through Indiana, northern Ohio, down through the flood district of the Buckeye State, and finally across the muddy Ohio River to Parkersburg. A circus-train travels slowly. With a string of thirty cars, many of them double length, and one engine, the reason is obvious. This is why the large tent show travels in from three to four sections.

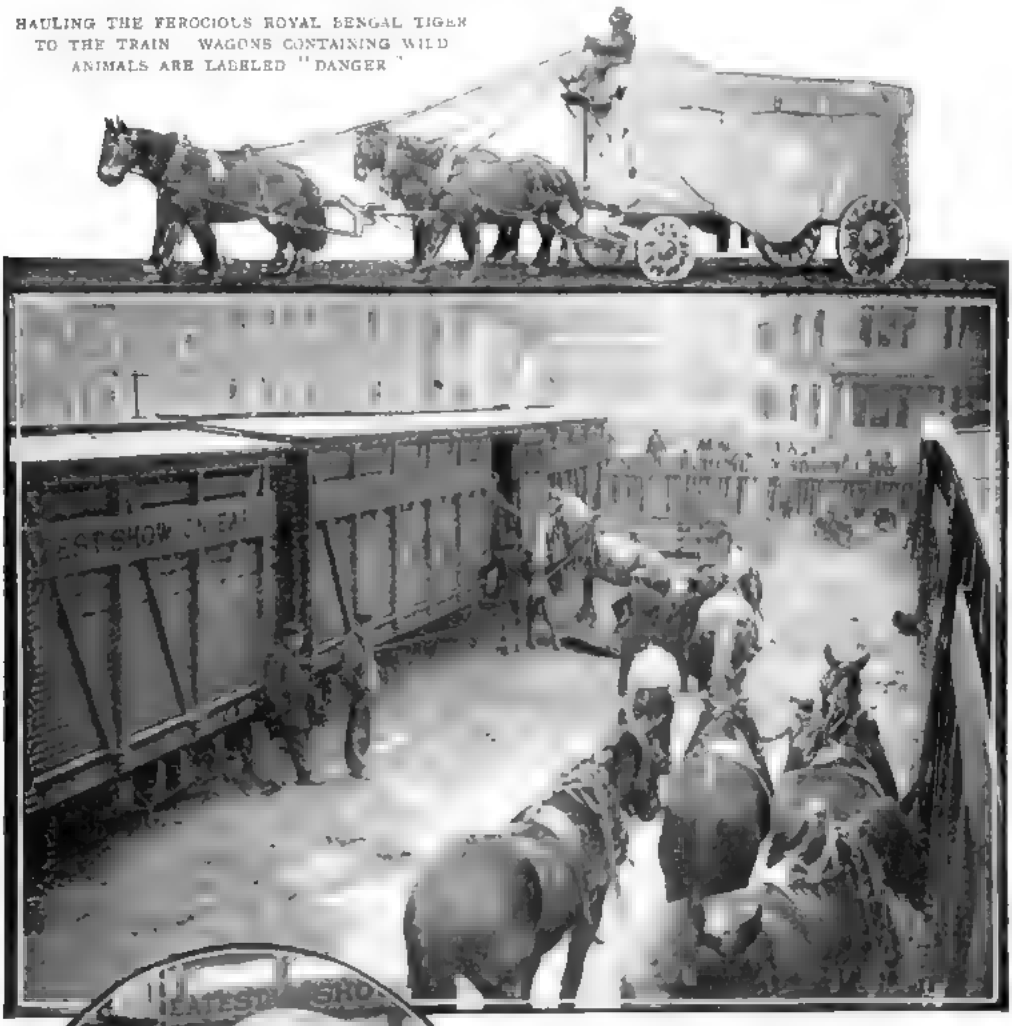
A delay was announced within half an hour after we had rumbled into the Parkersburg yards. We were traveling on the line of the Baltimore and Ohio, which winds its way south from the Ohio River through the West Virginia mountains. So rugged and precipitous is the country that the rails in many places are laid through a series of tunnels. It was these tunnels that abruptly halted our southern progress.

The circus transportation master cast a nervous eye on the giraffe and "bull" cars and sought the station-agent.

"Find out for me the dimensions of those tunnels we have to navigate," he instructed.

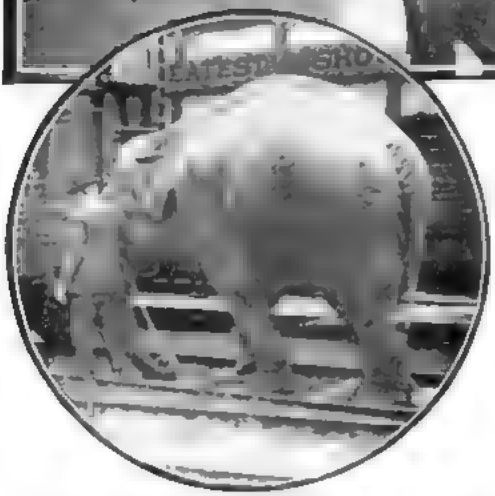
The agent wired the request to the di-

HAULING THE FEROCIOUS ROYAL BENGAL TIGER TO THE TRAIN. WAGONS CONTAINING WILD ANIMALS ARE LABELED "DANGER."



LEADING THE FINE TRAINED HORSES ON BOARD STOCK CARS. THE CARS ARE BUILT OF STEEL BECAUSE ANY SERIOUS ACCIDENT TO THE HORSES WOULD MEAN A SERIOUS LOSS

Photographs copyrighted by Paul Thompson, New York



THE ELEPHANTS ARE FREQUENTLY USED TO PUSH LOADED CARS, WHEN MAKING UP A TRAIN.

vision superintendent's office. A few minutes later he came out into the yards.

"Smallest inside dimensions eight by eleven feet," he reported.

The transportation master glared at the heavy "bull" cars. From the rails to the roof they measured twelve feet and a half. Our way was blocked.

"Have we *got* to go through the tunnels to reach Clarksburg?" he snapped.

"Unless you want to make a détour of a hundred and fifty miles, maybe a hundred and seventy-five."

The transportation master scowled. The détour meant not only a delay of from five to six hours, but an additional

mileage cost of from eight hundred to a thousand dollars. If certain of the larger cars could not pass the intervening tunnels, however, the passage could be made by a considerable section of the train without difficulty. At nine o'clock the section destined for the détour was ready. But the problems of the night were not yet over. The longer route meant a road-bed full of sharp curves and steep grades. The heavy circus-cars are reenforced by chains, girding the cars to the trucks in the event of accident. These chains might interfere seriously with the cars' balance on a sudden curve. The chains must come off

Another hour elapsed before the last chain was removed and we were again ready to continue, but it was an hour that might have saved a disastrous wreck. A circus-train isn't insured. The vicissitudes are so many and so varied that the most optimistic underwriter will balk at the risk.

The rolling-stock of the Ringling circus, nearly one hundred cars, most of them constructed on special designs, represents an investment of $750,000. The contents of these cars are quoted at as much more. Thirty thousand dollars are tied up in tents alone, and this is an annual investment, as the canvas has to be renewed each season. One hundred thousand dollars would be a conservative valuation of the horses

$300,000 Worth of Wild Animals.

To set anywhere like an exact estimate on the menagerie would be next to impossible, as it is constantly being added to by new importations and decreased by death. Its market quotation would be at least three hundred thousand dollars. We have yet to add the hundred and one details of equipment — seating accommodations for an audience of fifteen thousand, the mechanical accessories of the various acts, the vehicles of transportation to and from the show-grounds, the utensils of the commissary department, the scenery for the ballet spectacles, costumes of the performers, many of which, unlike a theatrical production, are furnished by the management

The great tent show travels more than twenty thousand miles in the course of a season. Most of us associate the opening of the circus season with spring. As a matter of fact, it begins in January. While the world is shivering in the midst of the blasts of winter, the circus proprietor, with certain members of his executive staff, is poring over a strange array of documents – maps, charts, weather reports, bank statistics, census tabulations. He is plotting the season.

There is nothing haphazard about it, nothing left to chance, no gaps to be filled in the future. The expert circus manager carries a sort of mental photograph of the United States. He must know the department heads of the various railroads, the road-bed, the mileage, the location of dangerous bridges, of long tunnels, the distance between towns, the grades in that distance.

Finding the Best Show Grounds.

But this is only part of the knowledge necessary to his success. He must know the towns at which he is to show better perhaps than most of the residents of those towns. For instance, how many of the old-time residents of Omaha would know where to find enough dirt at an hour's notice to fill in a fifteen-acre lot in the event of rain? How many would know the resistance capacity of the local bridges?

It is not the population of a community that is the circus manager's most direct concern. He must know its financial rating, whether it is a manufacturing or a farming community, and its spending disposition. He must know something of its streets and their relative positions, and their facilities for a parade. He must know how far it is from the next populous center, and what kind of railroad connections he can make into or away from it.

The making of the circus route is an intricate and delicately planned task occupying weeks. Into it enters the most complete geographical and commercial statistics demanded by any business enterprise.

When the first show-train rumbles out on its long season's journey early in April, the route it will cover during the next seven months is known with an exactness of detail, extending clear up to

the closing date in the fall. Even daily route-sheets for each month are issued before the close of the preceding month, and sometimes these are printed two weeks before distribution.

Millions of Resplendent Posters.

Of course, it may be necessary to change the itinerary suddenly. Such a contingency rose with the Ringling circus at the time of the spring floods in Ohio. The show had been booked to open at Zanesville, with two more dates in the State. The disaster made it necessary to transfer the opening to Clarksburg, West Virginia, and avoid Ohio entirely. Perhaps such a change of program would not be necessary, however, more than three or four times in a whole season.

Almost coincident with the annual planning of the route is the preparation of the annual advertising literature. In the course of a season the advance cars will distribute 5,400,000 posters of from one to thirty-two "sheets" in size, not to mention 450,000 "sheet-books," or "couriers," gaily lithographed documents, crammed with the superlative adjectives of circusdom, and replete with dazzling pictures.

As a further illustration of the exactness of the circus organization, the disposition of nine out of ten of these posters is accounted for from the eight-sheet lithograph on a barn near the Grasshopper Crossroads, Nebraska, to the cardboard in the window of a bookstore in Toledo, Ohio. The circus leaves nothing to chance.

With the season's route marked, the advertising literature prepared, the long train of red cars ready for the first run of the year, let us follow the practical working out of the system that up to this point has been largely confined to paper. First for a word as to the personnel of the circus executive staff. Foremost, of course, is the general agent. Under him is a railroad contracting agent, the master of transportation with the show-train, a local contracting agent, whose duties cover the licenses, bill posting, lot contracts, hotels when used, and the arrangements for food for the stock.

The duties of this department are subdivided. In following the show-train, we have to deal first with what is known as Advance Car No. 1, containing the "three weeks" man and a staff of from fifteen to eighteen bill-posters. The car reaches the point of exhibition from twenty days to a month ahead of the date in the posters, and at once begins the deluge of flaming lithographs.

Not only the community is to be billed, but the surrounding country, maybe for a radius of fifty miles. This depends on advices from the railroad agent and the feasibility of excursions on show day. This is why a Western county seat of ten thousand may give a larger audience than Madison Square Garden, New York.

For three days the advance car may lie on a siding while its crew are scouring the city streets or country roads. The "three weeks man" also starts the newspaper publicity campaign, investigates the conditions of the show lot, the prices of the local markets, and, when he departs, sends a carefully typewritten report back to the red ticket-wagon, which serves as the circus business office *en route*.

Perhaps a week following comes Advance Car No. 2, whose operations are largely a duplicate of the duties of its predecessor, based on the report received from the first advance staff. The territory is rebilled, the publicity crusade quickened, and a canvas made of the lithographs and cards to make sure they are still in position, with especial attention to the advertising at excursion points. The modern circus has learned the advantages of the "follow-up" system.

Meeting the "Flying Squadron."

The "three days" car, seventy-two hours in advance of the show, is the next to swing into action. The man in charge faces a working day of anywhere from ten to sixteen hours. He must make the final checking-up of the lithographs, honor the orders for free seats, straighten any kinks that may have crept into the arrangements for the lot, or the licenses, or the parade route, complete the contracts for stock-feed, arrange for saw-dust or dirt for the grounds if the weather is threatening; in short, make certain that nothing within the range of

ordinary possibility will interfere with the reception of "the world's greatest show."

Even after the completion of his apparently thorough labors, the show isn't content. He is succeeded by the "twenty-four-hour man," and now the thrill of the circus is in the air. The community is surcharged with it. The locality is on the tiptoes of expectation. It is here that we appreciate the argument which a man in search of a job as twenty-four-hour agent shrewdly advanced:

"I can get along on four hours' sleep," he wrote—and was hired.

It is the twenty-four-hour man who must arrange for the delivery of the local contracts, find the best place to unload the show-cars, the most convenient spot for water, the shortest way from the railroad yards to the circus grounds. And then, too, he must attend to the final details of the parade route, check up the advertising bills, and when he goes to sleep must set his alarm-clock so as to be on hand to meet the "flying squadron"—the first section of the show-train, with the "cook house" and horse tents—when it rolls into the yards anywhere from four to five o'clock in the morning.

Leave Before Show Begins.

The circus proper is being taken down almost as fast as it is being put up. From the moment the morning parade returns to the grounds the equipment not of use in the day's program is being carried back to the train.

The loading of the cars for the departure has started before the first of the crowd has filed into the "big top" for the afternoon show. And before the last of the performers has finished "supper," which begins at four o'clock in the afternoon and is over by half past five, the tables and dishes of "cook house" are being packed for transportation.

The remaining sections of the train, with the "big top" and performers, may still have four or five hours to travel when the "cook house" is slung into position, the fire is started in the wagon ranges, and the details for breakfast for twelve hundred men and women are under way. Long before this, the twenty-four-hour man is checking up the local contractors as they begin the delivery of ten tons of hay, five tons of straw, and three hundred bushels of oats, which constitute an average day's supply for the stock.

Frying 2,400 Eggs.

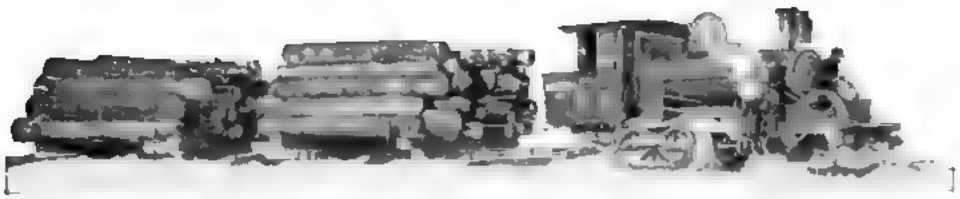
With the arrival of the last sections of the train—from two to three in number, with from twenty to thirty cars each—the work of the circus day begins in earnest. While the performers are clambering from the sleepers and wending their way toward the breakfast-table, for which the steward has fried six thousand pancakes, broken two hundred dozen eggs, and sliced eight hundred pounds of ham and bacon, the show-wagons are backing toward the long lines of "flats."

In something like twenty minutes the work vehicles are rumbling toward the lot—first the stake and chain-wagons, with the stakes, sledges, and ball rings, and then, in close and businesslike order, the canvas wagons; the rigging wagons, with the blocks, falls, and guy-lines; the pole wagons, with the center and quarter poles; the wardrobe, dressing-room, and property wagons, the side-show wagons, the candy wagons, the chandelier wagons, the "smithy" and water-tank wagons, the vehicles with the seats, jacks, and supports, the stringer wagons, and finally the cages and "hay" animals on foot.

Two Million Dollars on the Road.

John R. Agee, the boss of the Ringling show in the absence of the brothers the young man who looks like a boy and shows the foresight of a gray-haired veteran—would deem it an unpardonable sin were the morning parade not ready to leave the lot before the walls of the side-show were up.

This is the routine not for one day or one week, but for seven months. It begins in one of the central or eastern States in the spring. It is repeated in three-fourths of the States of the Union before that October night, somewhere in the South, which marks the close of the season.



A LOGGING EXPRESS THAT DOES NOT RUN ON RAILS.

WHAT THE RAILROADS ARE DOING TO SAVE OUR FORESTS.

BY CHARLES ALBERT WILLIAMS.

THE railroad has translated the word "forest" into "industry." Stripped of its broader suggestion, forest must be reduced to the more common term "wood." That makes our forests gold-mines.

Innumerable things that are in constant and widespread use are made of wood The paper upon which these lines are set down in cold type is a derivative of wood, and though we do not think of railroad wheels nowadays as being of less sturdy material than steel, thousands of wheels for use on the most luxurious of our cars are composed of wood converted into paper and reenforced by steel

The story of our forests is a chronicle of human interest, not of dry facts. Reduced to statistics, it remains only a mass of figures in which man's work is indiscernibly submerged. Its finer significance lies in the part that man plays in it all. But its more familiar aspect, as it is understood by those whose only contact with our forests is through the industry, is produced by our railroads more than by any other force.

GATHERING THE SEED OF A CALIFORNIA PINE BEFORE FELLING THE TREE FOR LUMBER

Photograph by Brown Brothers New York

Vast tracts of land, fertile with splendid trees, are the fields of many men's work. Fifty million dollars are spent every year to take the product of our forests and place the many resultant commodities in daily use.

In the lumber and timber industry alone about 700,000 workers are engaged. The products of their labor reach the enormous sum of $1,156,129,000, to which $648,011,000 is added by manufacturing the material into various commodities The figures cannot adequately repre-

sent the full extent of the vast activity that grows out of our forests, because the products of wood embrace an endless number of trades.

Forests could be stripped, huge trees felled by lumber-jacks, but most of the raw material would rot where it fell if

IN SUMMER EVERY POSSIBLE PRECAUTION AGAINST FIRE IS TAKEN. HERE WE SEE A RANGER STRINGING A TELEPHONE WIRE OVER THE FOREST RESERVE TO THE RAILROAD FIRE STATION

our railroads did not do so much to transport that material to plants and factories where it is transformed into the many wooden things that we know

The methods of the old days were sufficient unto those days, but the growth of the country, the greater demand for wood, has rendered such methods futile. The old drag teams, the old hand labor of the past will not do. Machines are necessary — more powerful saws, steam locomotives for hauling—these things are indispensable to the demand. Instead of six-horse teams laboriously and slowly hauling twenty tons of cut timber through long stretches of wilderness, caterpillar traction engines do five times as much work in one fifth of the time.

There are 191,000,000 acres of forest lands in American possession at the present time. These acres are prolific. A few years ago many of them were not. Conservation and the systematic efforts of the forestry division of the Agricultural Department have caused the change. Much has been written of conservation, but its big results are not generally known.

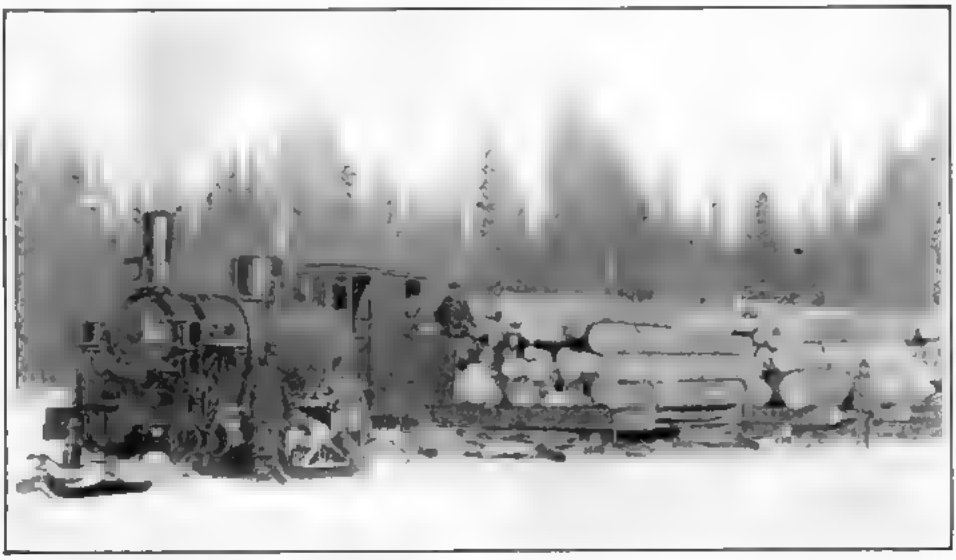
Prodigal men penetrated our virgin wildernesses. They needed room to grow; they made room with the same ruthless hands that almost exterminated our buffalo. It was but natural. They preceded the coherence and civilization that was perforce the sequence of their invasion. They knew only the exigencies of their day. There was waste—and conservation has come as a remedy for that waste.

$1,000,000 to Fight Fire.

In 1912 $6,540,861 was appropriated by Congress to the Forest Service through the Department of Agriculture for the purpose of reclaiming abandoned tracts and lending greater development to the more fertile regions. Most of our national forests are located in the mountains. They include the highest and most rugged portions of the Rocky Mountains, the Sierra Nevada, and the Cascade and Coast ranges.

Of the Congressional appropriation $4,718,688 was spent for scientific administration and protection. One million dollars alone was spent to fight forest fires. The fire-fighters of the wilds, or rangers, constitute a force of almost 4,000 men.

The Agricultural Department, in its annual report, states that on an average an entirely efficient service would require one man to each ten thousand acres in dangerous districts, but that at present the average is approximately one to each 60,000 acres. The average is drawn only from the face of the figures, as in some instances there is



HAULING TWO HUNDRED LOGS THROUGH A SNOW SWEPT MICHIGAN FOREST WITH A TYPE OF LUMBERING LOCOMOTIVE KNOWN AS THE "CATERPILLAR."

more than one man to each 10,000 acres. As the ranger-service is not yet developed to its full effectiveness, men are employed in greater numbers in those districts where danger is most imminent, as in the fire districts of the West, for instance. It follows, logically, that few men are necessary in the colder districts

A TRAVELING SAWMILL IN THE CANADIAN WOODS. IT CAN BE MOVED ABOUT ON THE WHEELS AT THE FRONT AND REAR, AND THE SAME POWER WHICH PROPELS IT IS USED TO SAW THE LOGS INTO TIMBER.

SENDING A TELEPHONE MESSAGE FROM LOOKOUT STATION IN THE PECOS NATIONAL FOREST, NEW MEXICO, THAT "ALL'S WELL!" THIS STATION IS SITUATED ON THE TOP OF GRASS MOUNTAIN, TEN THOUSAND FEET HIGH, OVERLOOKING THE ENTIRE RESERVE.

The interest of the ranger, however, is not in the number of him, but in his sturdy accomplishments. Following the trails of his various districts, his senses of sight, hearing, and smell assist him considerably in his work. He, in many instances, is garbed in the picturesque apparel of the cowboy who has loaned so much color to American fiction. To his ears frequently comes the roar of flames, though he may not see them and the wind may carry the smoke to another quarter.

In the majority of cases he relies on his eyes. At various points small clearings are made, and in these are erected rude observation-towers which afford a wide view of the surrounding country. In his tours of inspection he mounts the towers many times during the day's work, and it is in this way that he discovers and assists in the obliteration of fires that before his coming caused great destruction and sometimes grave loss of life.

How Rangers Are Appointed.

The rangers are appointed after suitable examinations under the direction of the department, and the higher positions of supervisor and district forester are filled by promotions from the ranks. The examinations not only require a thorough knowledge of the territory, but of the proper methods of fire fighting.

In many of the sections telephones are employed for forwarding alarms to points where fire-fighting crews can be quickly assembled and rushed to the scene of the trouble. In other sections alarms are given by rifle shots The fine work of these men is seldom revealed to the public, for in countless instances this work occurs where there is little or no access to the press—regions where little of what is commonly termed "news" breaks out. Yet the stories are there—of men who die for comrades and for duty.

Trite government records touch but lightly on such phases of the forestry service—our national administration is most interested in what is accomplished, not in the infinite details of how these things are done. In vast fires that raged throughout southwest Wyoming a few months ago a dozen men met death in actual fire fighting while six died in attempts to rescue imperiled companions. The story is not told completely it is merely an unemotional relation of men dying for duty — there is not even a record of their names.

The Government's Good Work.

But the work of the forestry service cannot be too highly praised. It is development of a finer civilization, a recognition by the government that haphazard tactics are not effectual. The report of the Agricultural Department states that the forestry service has succeeded principally because it has been under Federal direction. States have cooperated with it admirably, but chiefly because it has

become a unit under national control it is doing what it was hoped it would do.

Private ownership of small tracts has retarded the work somewhat, but this private ownership has not been sufficiently extensive to cause much difficulty. Private owners of timber lands often defeat the efforts of the service, because the owners are more interested in the speculative value of their timber than in the interests of the department

The service, viewed broadly, is not only conserving and developing our forests, but it is helping to develop highways and schools. Population is necessary in many districts, and roads and schools are being constructed to facilitate the growth of such population and to further accommodate districts that are already being settled.

In this work the railroads are doing a great service. Not only are they bringing to the public attention the opportunities and advantages present in our unexploited regions, but they are assisting in such settlements by making it less difficult for the modern pioneers of our great country to reach such points. Wood and the many commodities made of it are a valuable item of freight, and anything that increases such freight is a profitable investment.

LOCOMOTIVES AND CATERPILLAR ENGINES ARE USELESS ON THE STEEP MOUNTAIN SLOPES WITH THEIR PROHIBITIVE GRADES. AFTER THE TREES ARE FELLED THEY ARE DRAGGED DOWN THE MOUNTAINS TO THE RAILROADS.

Worry is rust. It will undermine the human machine just as disastrously as it attacks the finest rolling-stock.

RED TAPE ON GERMAN RAILWAYS.

Excursion Trains Can Only Run in Certain Weather, and To-day's Weather Is Based on Yesterday's Business.

TALK about red tape and routine in railroading! Go to Germany! A good example is given with "nothing extenuated and naught set down in malice."

In the time-table books, with their blue-white covers (Bavarian national colors), there is recorded a train which starts from München for Starnburg at 9.40 A.M., but with the express understanding that it is "only on Sundays and holidays when the weather is good, and between March 2 and November 1."

Now, on March 2, the heavens being bright blue over Munchen and everything glittering in the early spring sun, a number of jolly excursionists reached the station to board the train in question.

At the gate, however, they received the information that "the train does not run!"

After recovering from their astonishment the feeling of independence was victorious. The would-be excursionists hastened to the station manager—not to murder him, and not even to complain

"As loyal Germans," relates one of them, "we doubted not for one moment that the decision of the higher officials was full of deep and secret wisdom. We hoped only for openness and willing guidance to understanding." He then related the following dialogue which took place between the leader of the excursionists and the station manager.

EXCURSIONIST: "We wish to ask why the train does not run to-day. According to the time-table, it should run when the weather is good."

MANAGER: "Whether the weather is good or not is for *us* to decide"

EXCURSIONIST (modestly pointing to the window through which real cascades of golden light poured): "But—"

MANAGER (unpleasantly): "Although it is for you fine weather, for us it is not fine weather by a long shot!"

EXCURSIONIST (showing curiosity): "Please, when is it, according to the opinion of the officials, fine weather?"

MANAGER: "When the red-yellow flag is hoisted." (Pointing with finger to the well-known sentence in the time-table: "Departure of trains arranged for Sundays and holidays when the weather is good will be indicated by red-yellow flags at the stations.")

EXCURSIONIST: "Is not the real meaning of the flag only in doubtful cases to explain to the public? And on a radiant day like this, is any doubt possible?"

MANAGER: "No doubt is possible, but we must have an official point of view."

EXCURSIONIST: "Now we comprehend that ordinary fine weather and official fine weather are not the same. But we wish only to ask why the weather to-day is not officially fine?"

MANAGER: "But don't you see that you are only five or six persons?"

The excursionists stand for a time quite discombobolated as the thought finally enters deep into their understanding that the fact of their being collected in greater or less numbers can have such tremendous cosmic influence and be the last deciding element in causing atmospheric conditions

EXCURSIONIST: "I will not say that, in the first place, many more persons than are here want to travel by that train and, in the second place, that the train should run not only in case of excursion demands, but without any exception when the weather is fine. I only ask, how could you know beforehand how many persons would come here?"

MANAGER (evasively): "Here the gentlemen can see how accommodating we are to the public! On this sheet is given how many extra trains we have already sent early this morning to Schliersee and Bayerischefell."

EXCURSIONIST (with somewhat idiotic expressions): "But—but—in our opinion, you should have reckoned on a good contingency to travel by our train."

MANAGER: "To Starnburg? Devil a bit We can judge of that very well by the evening traffic. We knew that there would be no necessity to hoist the flag"

Long stupid pause

THE COURAGEOUS EXCURSIONIST (exerting his utmost will-power): "Then on what numerical basis does the railway management decide whether or not it is fine weather to-day?"

MANAGER. "On the basis of yesterday's business."

The discussion was at an end The staggered excursionists left the station, some with an insane smile on their lips, others with symptoms of incipient nervous disease The pleased manager remained behind, superior to the petty laws of logic.

CURRENT MECHANICS

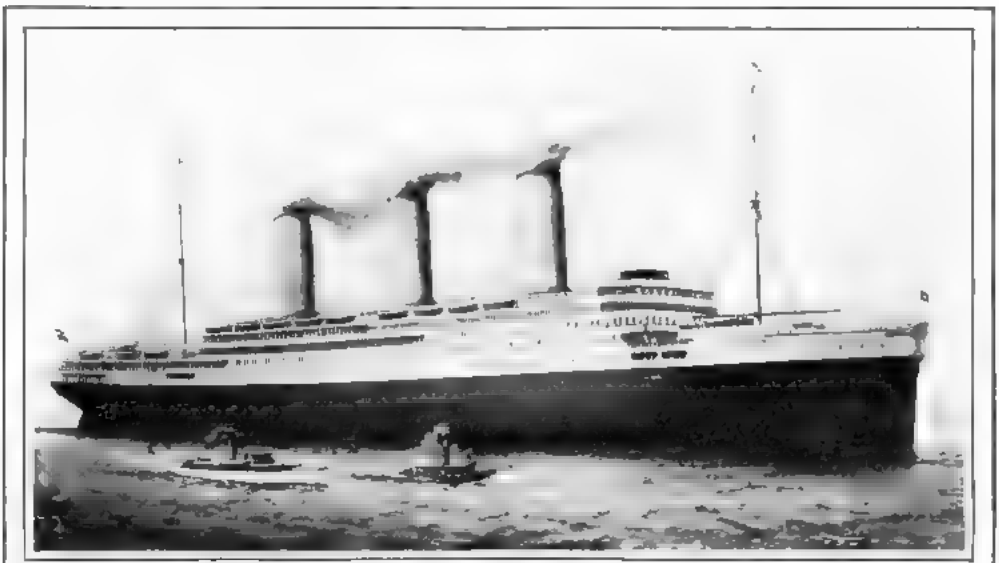
A Department Devoted to the Progress of Mechanical Development—Written, Illustrated and Analyzed So that It Is Plain to Everybody.

HEROIC PROPORTIONS OF LATEST MARINE MONSTERS.

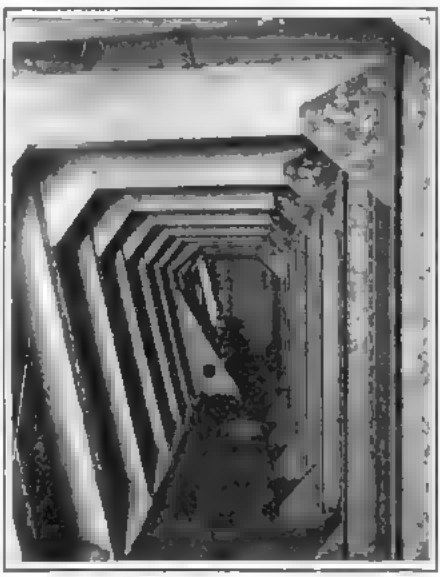
THIS is a record-breaking year in the history of ocean-steamship building. The construction of the largest steamers ever released from the ways marks an extraordinary progress in an industry almost as old as history itself And, strangely, this progress has been made in a comparatively few years.

From the days of the first mariners to the beginning of the eighteenth century the conquest of the sea was far from what it became in the nineteenth century and the wonders that have been the fruit of the twentieth. The last fifty years of the nineteenth century brought forth the beginnings of the modern gigantic merchant vessels and fighting craft, and the industry has gone ahead amazingly.

Two huge boats, the largest in the world, take their places on the sea this year—the Imperator and the Aquitania. In size, construction, and magnificence they surpass anything that has ever sailed the oceans. The Imperator is slightly the larger, being 919 feet long, while the Aquitania is 901 feet long. The Imperator, a German boat, is already plying the waters. The Aquitania, a British



THE IMPERATOR, GERMANY'S FLOATING CITY AND THE LARGEST STEAMSHIP IN THE WORLD IS 919 FEET LONG AND HAS NINE DECKS EACH WITH AN AREA OF 30,000 SQUARE FEET SHE CAN ACCOMMODATE COMFORTABLY OVER 4,000 PASSENGERS.



THERE IS A SPACE OF TWELVE FEET BETWEEN THE OUTER AND INNER HULLS. SHOULD THE OUTER HULL BE TORN BY ACCIDENT, THE INNER HULL WILL KEEP THE BOAT AFLOAT

liner, is not yet in service, but it is expected that she will excel the Imperator in speed, thus offsetting the eighteen feet difference in length.

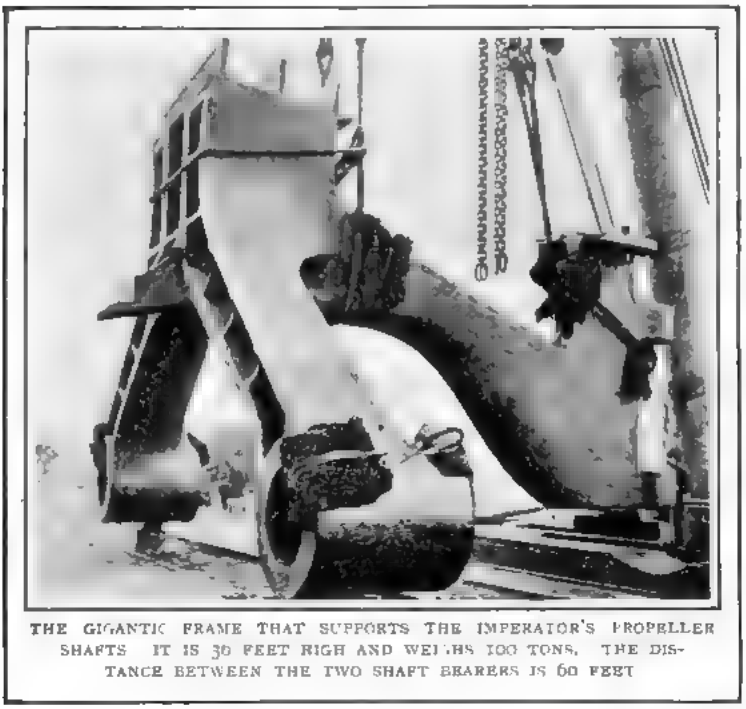
The colossal proportions of the Imperator are vividly suggested by several of the accompanying photographs. They are further emphasized by a few rude comparisons with things more familiar to land-lubbers. The Woolworth Building in New York City is 770 feet high It is the tallest building in the world. If it were possible to stand the Imperator on end she would overtop the record sky-scraper by 149 feet. From her keel to her boat-deck she is almost 100 feet high — practically the equivalent of an eight-story building. Her beam or width is 98 feet.

A town of four thousand persons can be quite a busy, prosperous place, and even be sufficiently important to support a daily newspaper. The Imperator in her many cabins and compartments could accommodate more than the four thousand men, women, and children who

SETTING THE NINETY TON RUDDER OF THE IMPERATOR. THE POST ON WHICH THIS RUDDER SWINGS WEIGHS 110 TONS. THE MOVEMENTS OF THE RUDDER ARE CONTROLLED BY AN ELECTRIC SYSTEM OPERATED IN THE PILOT HOUSE

THE IMPERATOR'S MAIN ANCHOR. IT IS THE LARGEST EVER MADE. IT WEIGHS 24,455 POUNDS AND IS 53 FEET LONG. THE NEW BOAT ALSO CARRIES TWO BOW ANCHORS WEIGHING 17,636 POUNDS EACH

SECTION OF THE CHAIN USED IN RAISING THE MIGHTY ANCHOR SHOWN IN THE UPPER PICTURE. IT IS 3,960 FEET LONG, AND IS MADE UP OF FIVE-FOOT LINKS. THE ENTIRE CHAIN WEIGHS 485,000 POUNDS



THE GIGANTIC FRAME THAT SUPPORTS THE IMPERATOR'S PROPELLER SHAFTS. IT IS 36 FEET HIGH AND WEIGHS 100 TONS. THE DISTANCE BETWEEN THE TWO SHAFT BEARERS IS 60 FEET

constitute such a town. They could be comfortably housed, well fed, and entertained on the Imperator, besides have plenty of room for exercise and sports. This is a feat that no city in the world has ever accomplished, or even attempted, yet it is done without confusion or discord on a great vessel like the Imperator every day she is in actual service.

There are nine decks, each measuring almost 80,000 square feet in extent. On the decks are many means to make passengers comfortable, permit them to enjoy their gymnasium, golf, tennis, moving pictures, and a splendid library.

This enormous boat of 60,000 tons displacement is forced through the water at a maximum speed of about twenty-two knots an hour by turbine engines of 60,000 horse-power. The turbines are quadruple, and one is equipped with 50,000 blades, every one of which was attached by hand riveters.

In one of the pictures is shown her great rudder-post, weighing 110 tons. The rudder carried by the post weighs ninety tons—ninety tons of great power to guide the marine mastodon on her way. And this mighty piece of equipment is controlled without trouble or effort by electric devices in the pilot-house. Should these electric devices fail, which is practically impossible, owing to the manner in which their operation is safeguarded, the rudder can be controlled by a wheel.

Her anchor, shown in the picture at the top of page 429, is the largest in the world. It weighs 24,455 pounds and is attached to some of the heaviest chain ever made. The size of the main chain can well be imagined from the picture at the bottom of page 429. Each link is five feet long. Smaller chain is used on the two anchors, which weigh 17,636 pounds each. In all, the Imperator carries three-quarters of a mile of chain, with an aggregate weight of 485,000 pounds.

One of the newest features of the German monster is her double bottom. The idea of consistently constructing ocean steamers with double bottoms was first brought forward after the sinking of the Titanic. The Lusitania and Mauretania, two of the fastest boats that ever crossed the ocean, were so constructed, but the Olympic and Titanic were not. The question probably would not have been given very widespread serious consideration had not the Titanic been sunk by an iceberg.

After the investigation into the cause of the disaster the question was raised whether or not she would have survived had she been built with a double bottom. As one outcome the Olympic was placed in dry-dock later and equipped with an inner shell to protect the ship in case of injury to the outer. It is most likely that a majority of the better boats constructed from now on will be so protected. The distance between the outer and inner hulls of the Imperator is about twelve feet, thus making the boat prac-

tically two boats—one within the other Between the dimensions of the Imperator and the Aquitania the difference is so small that the English boat's figures sound as large unless a direct comparison is made. She is 901 feet long and ninety-seven feet wide. The distance from keel to boat-deck is ninety-two feet six inches. Her displacement is 47,000 tons. She was launched on April 21 and she is expected to attain a velocity of twenty-three knots an hour. The space between her outer and inner bottoms is fifteen feet.

Her capacity for passengers and crew is 4,222 persons. The crew will number 972 men. Her first-class cabins will accommodate 600 people; her second, 698, and her steerage, 1,900. The very latest types of life-saving devices will be carried.

Her boiler-rooms alone cover 16,794 square feet In all, there are twenty-one boilers, each with eight furnaces. The boilers will carry a steam-pressure of 195 pounds. She has three engine rooms.

Both the Aquitania and Imperator will be thoroughly equipped with all the

THE CONSTRUCTION OF THE AQUITANIA'S INNER HULL AS SEEN FROM THE STERN THE SPACE BETWEEN THE OUTER AND INNER BOTTOM OF THE AQUITANIA IS FIFTEEN FEET TWO MILLION RIVETS WERE USED IN BUILDING THIS ENORMOUS FISHLIKE FRAME.

THIS IS THE FRAME THAT SUPPORTS THE AQUITANIA'S RUDDER AND PROPELLERS AND ALSO FORMS THE "BRACKET" FOR THE STERN OF THE BOAT. IT WEIGHS TWENTY TONS AND IS HANDLED AS ONE PIECE. THE WHEEL BESIDE WHICH THE MAN IS STANDING IS ONE OF THE DRIVERS OF AN ENGLISH EXPRESS LOCOMOTIVE

contrivances for making travel at sea safe. Taken in their entirety, the boats are veritable wonders of ship-building. No ships of their type have ever equaled them in size or in the completeness of their construction. Yet, great as they are—first ships of the world—their distinction is to be short-lived, for Germany will build a still larger vessel—the Vaterland. She will be 950 feet long.

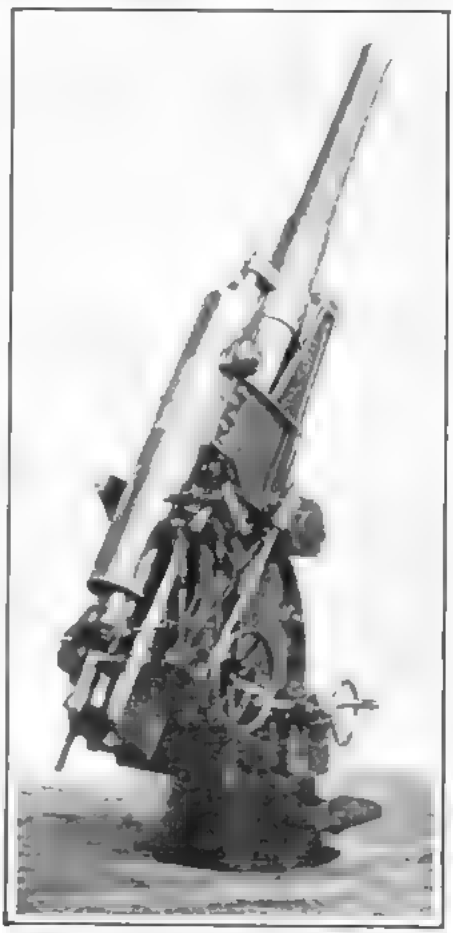
The Vaterland has already been launched and the work of finishing her is proceeding rapidly. Her maiden trip will probably be made before the end of the year. The most imaginative mind can hardly visualize or describe what the great ships of the future will be like. Every phase of ship-building is forging ahead, and there is such a constant improvement in all the things that go into the construction of a modern boat that the wonders of the nineteenth century will surely be insignificant when compared with the wonders of the twentieth.

NOVEL ARTILLERY TO FIGHT THE NAVIES OF THE SKY.

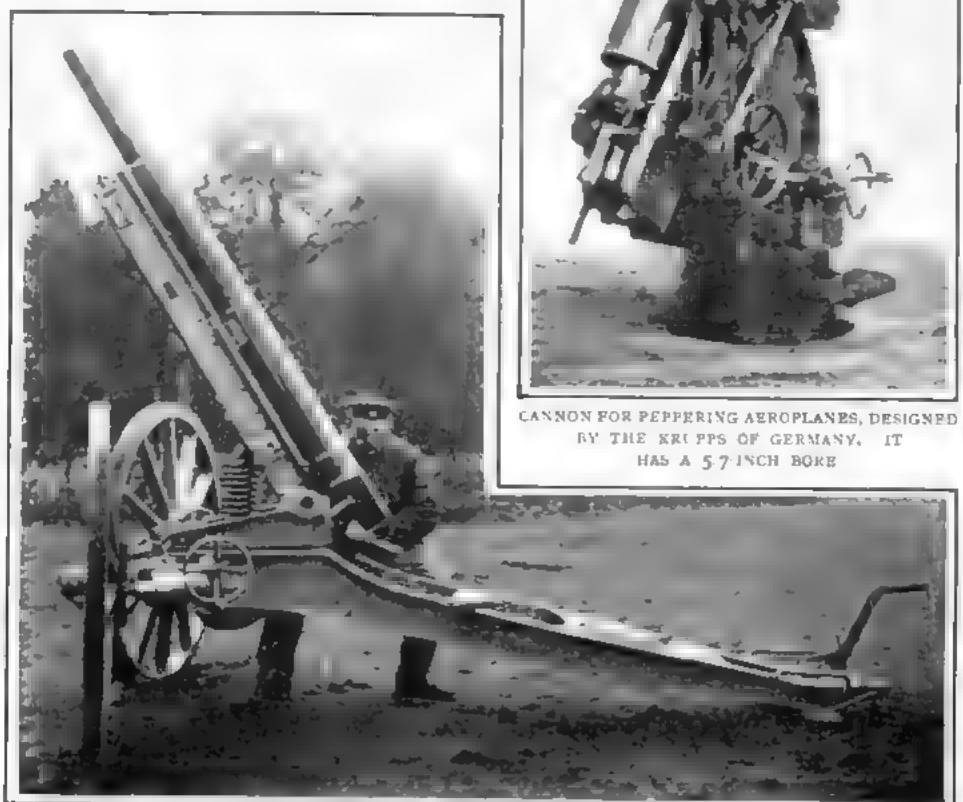
IN five years the air-ship has developed from what many considered the plaything of a faddist to a powerful implement of war. Five years ago the aeroplane and dirigible were queer craft that received little serious attention from any save the pioneers in man's conquest of the air. To-day aviation is one of the greatest possibilities of the future.

The accompanying illustrations, with the briefest descriptive word, would almost tell their own story. To the man interested particularly in military aviation—the possible uses of the aeroplane in war—they tell it plainly. The air-ship is no longer an experiment. It is a machine in which perfection may cause vast changes in many phases of our activities.

The great battles of the future may be fought from aeroplanes. Powerful battle-ships of the present may be rendered obsolete by them. No one can



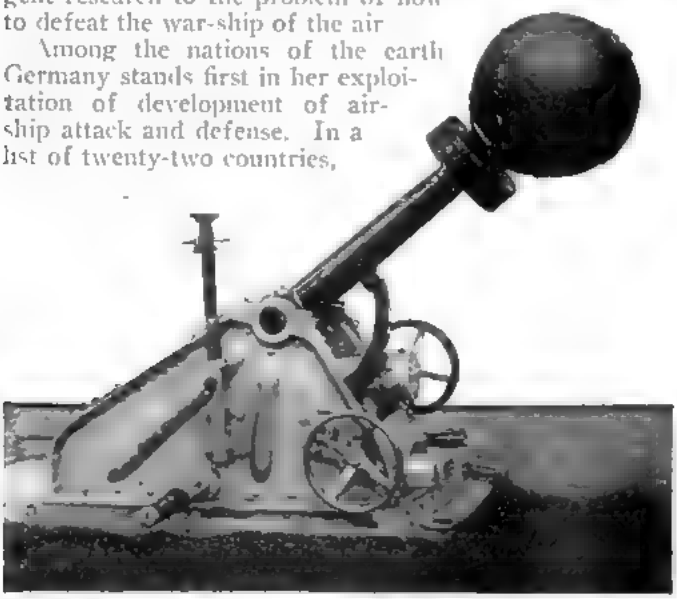
CANNON FOR PEPPERING AEROPLANES, DESIGNED BY THE KRUPPS OF GERMANY. IT HAS A 5.7-INCH BORE



IN THIS LARGER TYPE OF FIELD CANNON THE WHEELS ARE SO ARRANGED THAT THE GUN MAY BE EASILY LINED ON AN ENEMY. WHEN READY FOR TRANSPORTATION THE WHEELS ARE BROUGHT HORIZONTAL WITH THE CARRIAGE

fully predict what may happen ultimately, but it is very obvious from the trend of events that the air ship is irrefutably a weapon of the most modern type. The best proof of this is the fact that the countries in which aviation has received the most serious attention are devoting millions of dollars and persistent intelligent research to the problem of how to defeat the war-ship of the air.

Among the nations of the earth Germany stands first in her exploitation of development of air-ship attack and defense. In a list of twenty-two countries,



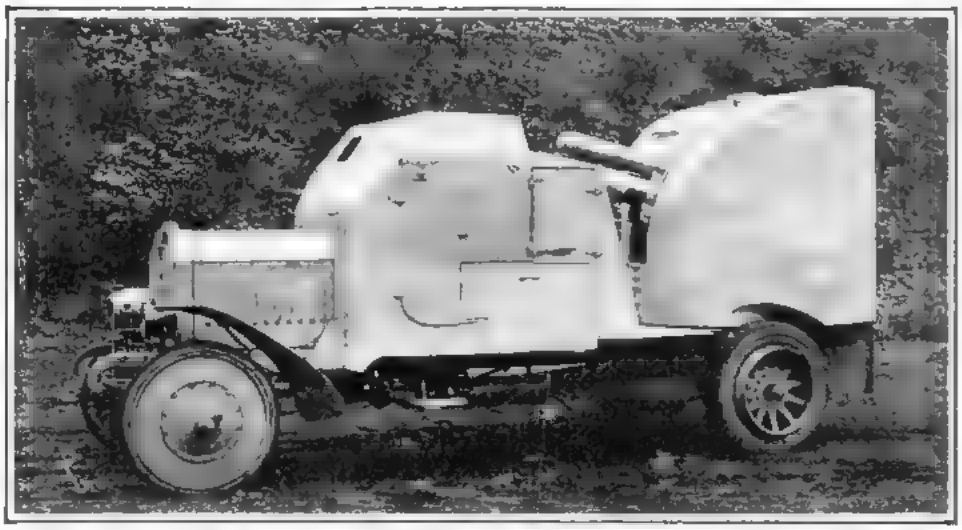
THE BOMB SHOWN AT THE MUZZLE OF THIS GUN IS ATTACHED TO A SHORT SHAFT THAT FITS INTO THE BORE. WHEN THE BOMB EXPLODES IT SCATTERS A CHEMICAL COMPOUND THAT POISONS THE ATMOSPHERE

as shown from the table reported from *Aircraft*, the United States stands thirteenth. While Germany has a formidable array of 310 aeroplanes and 22 dirigibles, this country has but six aeroplanes and one dirigible. Apparently America is not prepared for war in the sky—is not prepared to repulse the attack of menacing air-ships. While Germany is spending ten million dollars to gradually perfect the war-ship of space, the United States is spending a paltry one hundred thousand dollars.

After Germany, France is most vitally interested. Her aeroplanes number 280 and her dirigibles nineteen. Her government has placed eight million dollars at the disposal of military authorities for the development of air defense. In no other country in the world, however, is the public more intensely concerned in aviation than in France. Her great strides have been made principally because of that public interest. Her government officials were more or less indifferent until four million francs were raised by popular subscription and expended to purchase 175 flying-machines, which were presented to the government for experimental purposes. Over the country are scattered forty-five flying fields of at least twenty-five acres in diameter, and all these fields are fitted with suitable hangars for the accommodation of air-ships of every sort, not alone military. At Rheims one of the largest flying fields in the world is maintained. It is four miles square. At present it is practically impossible to fly fifty miles in any direction in France without finding a proper place for air-ship ascent and descent.

In this way did the government of France respond to a demand fitly expressed by her citizens. The subscription of four million francs did much to transform the attitude of official France toward flying and what might come of it. It is rumored in many responsible quarters that the air rivalry of France and Germany is great because of many unsettled scores that still exist between the countries and the contiguity of their frontiers—in France on the east and in Germany on the southwest. Nevertheless, regardless of the real motive behind it all, the two countries have far outstripped the United States.

The position of Japan in the table also has a deep international meaning. She is seventh in the list, six places ahead of us. Her appropriation for military aviation is five times as large as ours. She is paying a broader patriotic attention to the air-ship than we are and, at the rate at which she is building now, in five years her planes and balloons will exceed ours many times more than they do now unless this country quickly realizes the importance of aircraft.

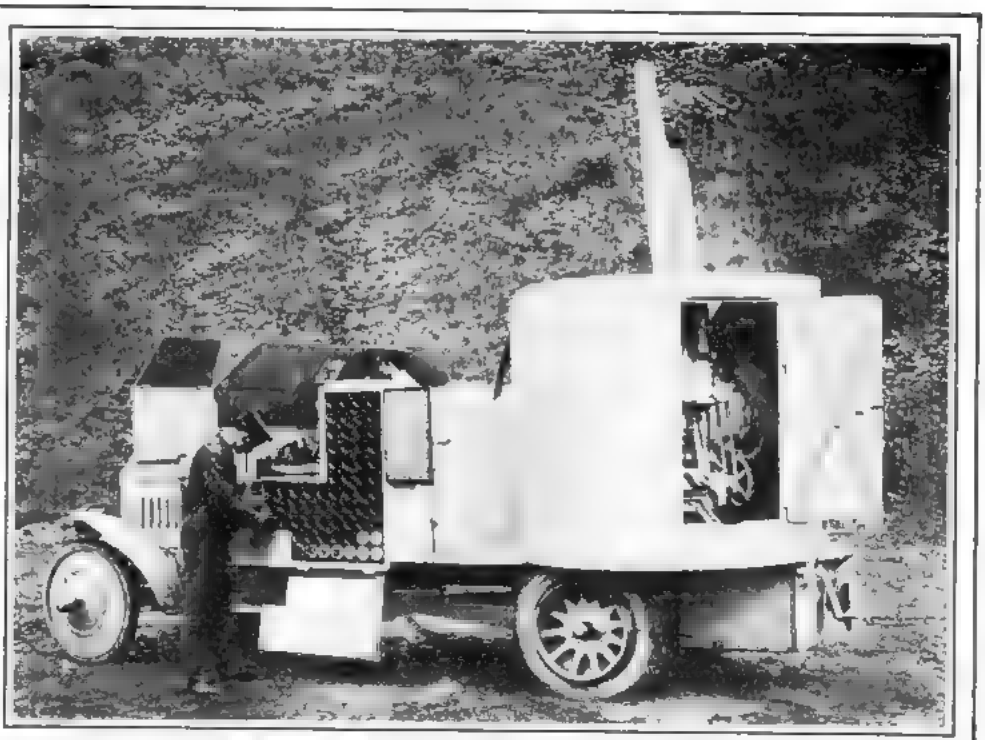


FIELD ARTILLERY MOUNTED ON A MOTOR-CAR SPECIALLY DESIGNED BY THE KRUPPS FOR THE GERMAN ARMY. THIS PICTURE SHOWS THE MACHINE READY FOR ACTION WITH THE HOODS CLOSED TO PROTECT THE MEN.

The people do not seem to fully realize the real portent of the flying man. The tone of the press has not accomplished much in awakening general appreciation. Our papers have been confined largely to the narration of spectacular incidents at contests and accidents which have resulted in the deaths of so many fliers

A large majority of these deaths in

THE MOTOR-MOUNTED ARTILLERY "UNCOVERED," SHOWING ITS APPEARANCE WHEN TRAVELING. GERMANY HAS ONE HUNDRED OF THESE MACHINES READY FOR USE AND EXPECTS TO DOUBLE THE NUMBER IN A YEAR



THE GUNNER IS STANDING BESIDE THE COMPARTMENT WHERE THE TWO-INCH SHELLS ARE STORED AT THE REAR IS SHOWN THE GUN CARRIAGE AND THE ANGLE AT WHICH THE GUN CAN BE POINTED

this country have been due to the aviator's desire to accomplish something more astonishing than his fellows. Men cannot, unless they are independently rich, concentrate their efforts on flying if there is no other reward than prize money and the profits of the moving-picture machine with accompanying lectures.

We do not seem to be interested in flying as a scientific problem and a factor of the future. Our view-point seems to be well expressed in the statement of a well-known aviator.

"When you take to flying," he said, "people immediately wonder when you quit the circus as a tight-rope walker or a trapeze performer."

Carrying a passenger or two in America is always marked in the newspapers by a fulsome story. The thing is treated as if it were something unusual a big step forward from the circus stunt. The latest record of the Victoria Louise, a German dirigible, reveals that in 497 hours she made 225 consecutive trips, covered 17,737 miles, and carried in all 4,326 people. These figures prove that the air-ship, of whatever modern type, is no longer a means of affording pleasure to reckless pioneers.

In Germany's fleet there are six armored dirigible balloons that can fly, barring the unforeseen, for forty-eight uninterrupted hours without being obliged to descend and replenish gasoline or hydrogen for the bag.

A further proof that the air ship is becoming a real foe in time of strife is the anxiety now evinced to produce guns of various types which can be used to defeat the fighters of the air. Our pictures have more than a pictorial attraction. They show the most effective of modern weapons of defense against air-ship and dirigible

The air-ship has come to stay and to eventually supplant many of the things that may seem permanent now. As far back as 1874 guns were used against balloons. The aircraft of to-day are a remarkable refinement of the balloon They will undoubtedly take their place in the conflicts of nations, and the world

is striving to find some method of defeating them.

American enthusiasm must be aroused. The army and navy need opportunity to train men for the air-service to make us as efficient and well-equipped fighters in the struggles of the new era as we have been in the old. Here is the table showing how the nations of the world rank in ownership of the battle-ships of the sky:

	Country	Aeroplanes	Dirigibles	Expenditure
1	Germany	310	22	$10,000,000
2	France	280	19	8,000,000
3	Russia	120	10	5,000,000
4	Italy	80	7	3,000,000
5	England	50	6	2,500,000
6	Austria	30	4	1,000,000
7	Japan	25	3	800,000
8	Brazil	18	3	500,000
9	Belgium	30	2	400,000
10	Spain	20	2	200,000
11	Bulgaria	20	0	180,000
12	Greece	12	0	150,000
13	United States	6	1	100,000
14	Denmark	6	0	80,000
15	Holland	5	1	70,000
16	Turkey	5	0	60,000
17	Mexico	5	0	40,000
18	Rumania	5	0	35,000
19	Norway	4	0	30,000
20	Argentina	3	0	25,000
21	Servia	3	0	25,000
22	China	1	0	15,000

HOW CANARIES SAVE LIVES.

IN the vast coal-mining area of Pennsylvania, where thousands of men are obliged to work under ground and where the most elaborate preparation and precaution are taken in order to save their lives from deadly gases, perhaps nothing has been quite so successful as the delicate, golden-throated canary.

Wherever coal is mined—in the great collieries of Newcastle, England, as well as in Pennsylvania—the delving miners occasionally tap a pocket of poisonous gas. So insidious are these deadly fumes that frequently they will force through crevices, and before the miners are aware, the air they are breathing is so poisonous that they are overcome before they can make their escape. The little canaries, tripping about blithely in their open cages, are speedily sensitive to the slightest fumes of the gas. The moment that a miner notices the birds getting drowsy, the moment they fail to chirp with their usual avidity, droop their heads and close their eyes—then beware of the prevalence of deadly gas! The miners then pick up the cages containing their tiny little life-savers and easily escape with them to the open. Thousands of these little birds are used in the great coal-mines of the world. Frequently, however, the miners tap a pocket of gas and an explosion follows. In such a case the little songsters are of no avail

COAL MINER READY TO DESCEND TO WORK IN A COLLIERY. HE TAKES WITH HIM TWO CANARIES. THESE BIRDS ARE SO SENSITIVE TO THE SLIGHTEST FUMES OF ESCAPING GAS THAT THEIR CONDITION QUICKLY WARNS THE MINERS TO ESCAPE

USE FEWER BLANKETS, BUT HEAT THEM BY ELECTRICITY.

IT has come to the attention of the medical fraternity on many recent occasions that invalids who are bedridden, and little children, frequently suffer from the great weight of bedclothes. This is especially so when the weather is very cold and considerable covering is needed to produce warmth. To overcome this objection and give the body sufficient warmth, an electric-heated blanket has been put into general use. It is light, soft, and flexible, and weighs only half as much as the ordinary comforter. The electric heat is applied by nickel-plated "heaters." The current may be adjusted so that the heat will not rise above a certain degree, thus precluding the possibility of endangering the sleeper by too much heat. The "heater" can be attached by ordinary circuit wire to any electric-light socket.

Aside from invalids and children, the electric blanket should appeal to all who have any regard for the hygiene of the bedroom. Most people are too prone to disregard the necessity of fresh air, not only for the purpose of breathing, but for the *outside* of the body as well. Many doctors are now advising against heavy coverlets even if the windows of one's room are kept open. The pores of the body need fresh air, and fresh air cannot find its way through the thick covering of ordinary bedclothing. The pores are constantly throwing off the poisons that generate in the body. They must be supplied with fresh air in order to perform this important function. The electric-heated blanket helps to solve this problem. The blanket may be covered with any sort of prettily designed coverlet.

LITTLE CHILDREN AND BEDRIDDEN PATIENTS WHO SUFFER FROM THE WEIGHT OF HEAVY BEDCLOTHES WILL WELCOME THE NEW ELECTRIC-HEATED BLANKET WHICH GIVES A UNIFORM AMOUNT OF WARMTH

COOKING A COAT OF PAINT ON A PASSENGER CAR.

STEEL passenger-cars for the Pennsylvania Railroad are now baked several times in a huge oven before they are ready for road service. The baking has to do only indirectly with the fact that the cars are of steel. It is to harden the paint on the car, both outside and inside. Cars treated thus last longer, look better, cost less, take less time to paint, and are more sanitary. The oven is situated at the Altoona, Pennsylvania, shops. It is 90 feet 3 inches long, 13 feet wide, and 15 feet high Each end has two large doors which may be readily opened and closed.

The oven is lined on the inside with steel plate and on the outside with galvanized iron. The 3-inch space is filled with magnesia lagging, thus effecting the needed insulation. The doors are insulated in a similar manner. Along the walls of the interior of the oven are placed 16 rows of 1¼-inch steam-pipes, and along the floor, close to the walls, are arranged manifold castings with small lengths of pipe tapped in at right angles

A CAR IN THE OVEN IT IS BAKED IN A HEAT OF 250 DEGREES. THE COMPLETE PAINTING AND BAKING PROCESS TAKES ABOUT A WEEK

By this means over 2,000 square feet of heating surface is provided. A steam pressure of approximately 100 pounds to the square inch is used, thus making it possible to get an oven temperature of over 250 degrees Fahrenheit.

Ventilation supplies fresh air, which is required for the proper drying of paint, and provides for the egress of the volatile matter present. A track is placed on the floor of the oven and connected at each end of the oven with other tracks leading into the regular paint-shop where the different coats of paint are applied to the car before each baking operation.

First the car is primed all over, out and in, and baked for three hours. After partial cooling the surfaces are glazed, and uneven spots are puttied. The car receives a coat of "surfacee," is baked again for three hours, and then removed for additional coats of paint. Finally, after the necessary decoration, three coats of varnish are applied, each being baked three hours. The car thus enters the oven and is withdrawn several times in the course of the process.

All of the work done by the baking process of painting may be accomplished in six to eight days, thus effecting a saving in time of about ten days as compared with the standard or present air-drying system. Further, the paints and varnishes have been worked up so that they are especially adapted for this baking process, having greater elasticity

The checks and cracking previously found will be considerably lessened, if not almost removed. By oven painting the work is done under more uniform conditions, which at the present time are so hard to control. It enables the surfaces of the car to be heated uniformly and dried thoroughly, thus removing any objectionable moisture before the first priming coat is applied.

A considerable saving will be effected by the shorter time that cars will be held out of service when undergoing repairs.

THIS FERRY LAUGHS AT TIDES—IT RUNS ON RAILS.

WHEN THE LOIRE RIVER AT ST. MALO, FRANCE, IS AT LOW TIDE THERE IS NOT SUFFICIENT WATER TO FLOAT A FERRY SO IN ORDER THAT THE FERRY MAY RUN ON A REGULAR SCHEDULE AN INGENIOUS ENGINEER PUT IN OPERATION THIS ELEVATED PLATFORM WHICH CROSSES ON RAILS. THE PHOTOGRAPH AT THE LEFT SHOWS THE RIVER AT LOW TIDE

AN elevated platform which runs on rails and is hauled by a cable constitutes the curious type of ferry in use at St. Malo, France. St. Malo is in the province of Nievre and is located in the lowlands near the Loire River. The Loire overflows frequently and submerges the lower parts of the surrounding country.

The lower right-hand picture shows the ferry in operation when the condition of the river is normal. The platform rests on four steel uprights.

The steel uprights rest on a small four-wheeled flat car to which is attached the cable that pulls the ferry along the tracks.

ABE EDELOWITZ, THE PERFECT ONE THOUSAND POINT NEW YORK BABY, AND HIS MOTHER, A WORKING WOMAN OF THE TENEMENTS. LITTLE ABE, WHO IS THREE MONTHS OLD, WAS AWARDED FIRST PRIZE OVER ONE THOUSAND BABIES, BY A COMMITTEE OF EMINENT DOCTORS.

Photograph by Brown Brothers, New York

A PERFECT SPECIMEN OF HUMAN MACHINERY.

ALMOST any schoolboy or girl could tell you, in these days of precocity and general scientific knowledge, that man is not alone the noblest work of God, but the most intricate and perfect machine turned out of nature's shop.

But there are standards of excellence set by medical men for infants and adults which are seldom reached, for nature casts with flaws, like any molder who pours his metal in sand.

Searching the world over for the perfect type of infant, one would naturally look closest and longest in the surroundings nearest nature—the open fields, the mountain glades, the free reaches of the Western plains. One hardly would expect to find the perfect child in the close places of a city, where the roar of life's battle sounds unceasingly against tenement cliffs.

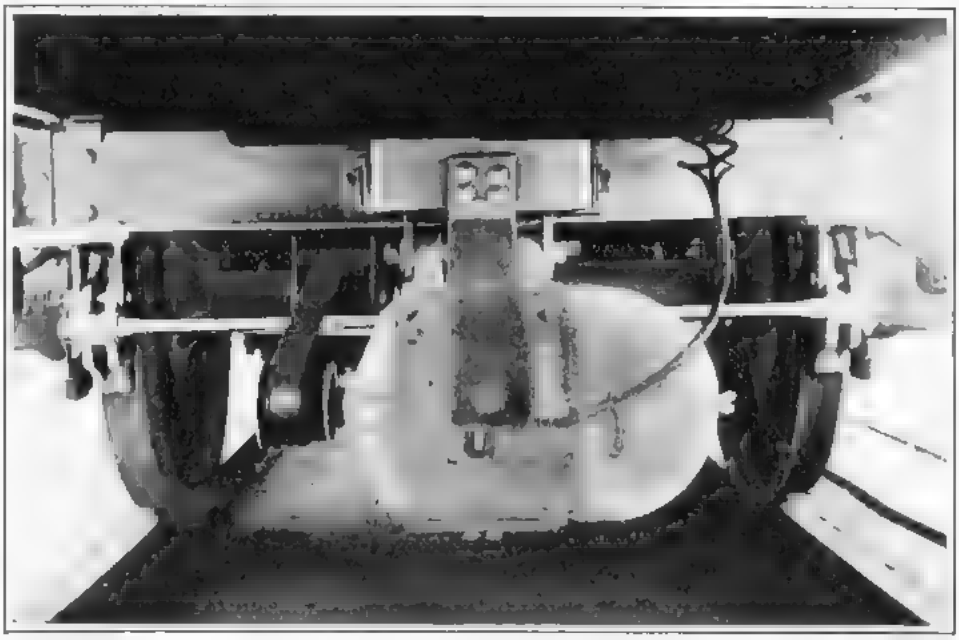
Yet there is where the doctors found Abe Edelowitz, three months old, who won first award in a contest in which hundreds of babies were entered. Abe scored 1,000 points, or flawless, and he

is the son of a mother who probably never heard of eugenics. But this adopted American daughter knows a great deal about work, as the primal women who mothered strong men knew it. She is a tenement mother, her ribs strange to the pinch of the corset, her heels unused to the pitch and tilt of French heels. In her the machinery of motherhood is flawless.

Work did it, the doctors say.

More work and fewer fads, rules, regulations, theories, pedigrees. That's what the women of America require to fit them for motherhood, the doctors of medicine declare. That is the answer, also, of Mrs. Mollie Edelowitz, tenement mother of the most perfect piece of human machinery in the city of New York.

DYNAMO FOR ILLUMINATING PASSENGER CARS.

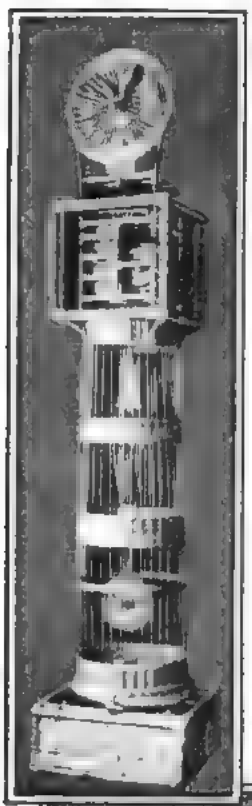


BRITISH RAILROADS ARE USING THIS BELT POWER DYNAMO TO FURNISH LIGHT FOR PASSENGER COACHES. THE DYNAMO IS ATTACHED TO THE TRUCKS THE MOTION OF THE TRAIN GENERATING THE CURRENT

A NUMBER of railroads in Great Britain are using a novel method for lighting passenger coaches. "Carriages," as they are called on the other side, by electricity at a cost that is said to be very small. The current is generated in a dynamo attached to the trucks — forward or rear, it does not matter. The dynamo takes its power from a belt which runs around the axle. This method, though simpler and as easily manipulated as the sapping belt method, possesses none of the disadvantages, as excess current cannot be passed through the battery owing to the perfectly regulated properties of the machine. The output, it is claimed, can be regulated to suit the demands of any class of service.

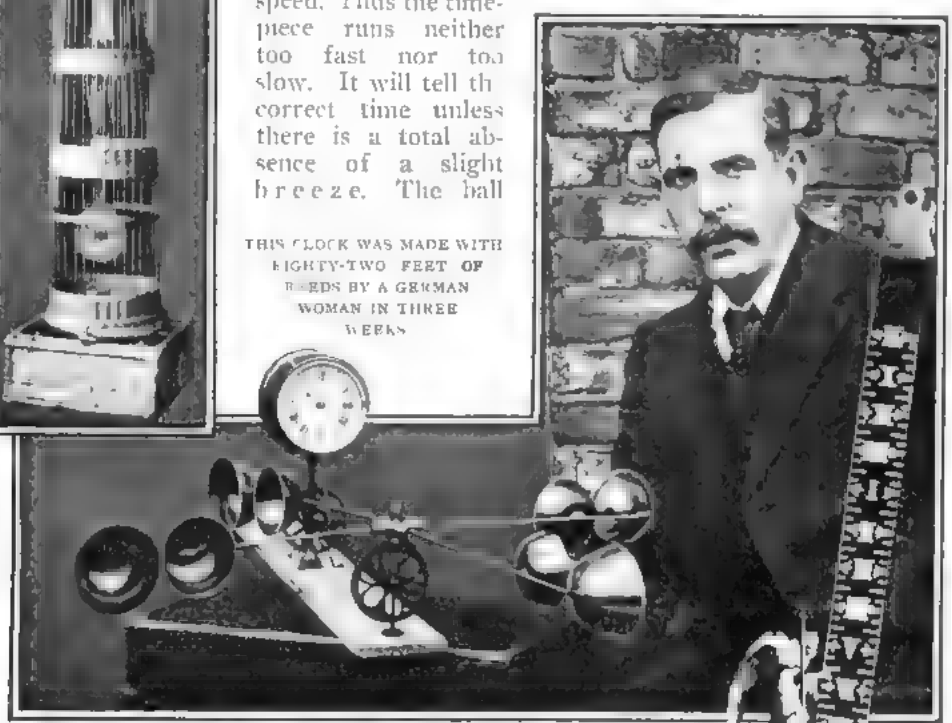
Cars were first lighted in Europe in 1838. Candles were then used. Oil and petroleum soon followed, and in 1870 gas was introduced on Prussian cars. About 1888 the question of introducing electricity to illuminate trains arose, and it was first used on the Novara Soregno Savona, an Italian railroad. Axle dynamos similar to that shown in the picture are used on some of the larger American roads.

CLOCKS THAT ARE RUN BY QUEER DEVICES.



HERE are the latest wonders of the clock maker. The upper picture is that of a clock made entirely of reeds The center picture is a clock driven by wind. The lower picture is that of a clock driven by its own weight instead of by a mainspring. The reed clock was made by a German woman. It contains in all eighty two feet of thin reed and required three weeks of tedious labor to shape and weave together. The wind clock is equipped with eight cups, which are turned by the slightest breeze. These cups drive the pair of crown-wheels plainly shown in the illustration and impart the action that "makes the wheels go round." The cups are so controlled that they can turn only fast enough to keep the works moving at the proper speed. Thus the timepiece runs neither too fast nor too slow. It will tell the correct time unless there is a total absence of a slight breeze. The ball

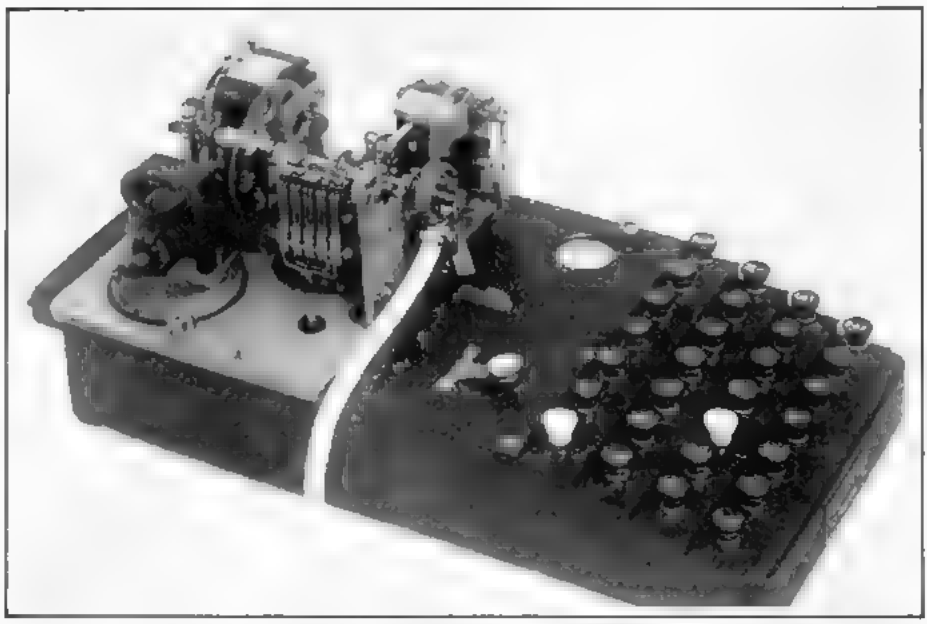
THIS CLOCK WAS MADE WITH EIGHTY-TWO FEET OF REEDS BY A GERMAN WOMAN IN THREE WEEKS



CLOCK DRIVEN BY WIND. THE CUPS WHICH DRIVE THE SMALL WHEELS AND RUN THE CLOCK CANNOT REVOLVE ABOVE A CERTAIN SPEED, THUS KEEPING CORRECT TIME

clock is also an English invention. It contains no mainspring, but it operates by the weight of the ball and tape wound on a spring drum. In starting the clock the ball which is a miniature of the earth is raised to numeral I. The tape winds automatically on the spring drum and holds the ball in place. In much the same way that a cuckoo clock is driven by the weight and chain, the ball moves slowly downward, unwinding the tape, and the hand of the small image of Father Time indicates the quarters of the hour. Only one of these clocks has been made. It is at present on exhibition in the window of a London clocksmith

THE GLOBE MOVES UP AND DOWN THE BAR, AND FATHER TIME INDICATES THE HOUR



THE SENDER STARTS THE MESSAGE ON THIS MACHINE THE INVENTION OF A GERMAN TELEGRAPHER, THE CHARACTERS BEING MADE BY A TYPEWRITER KEYBOARD INSTEAD OF THE REGULAR KEY

4,000 WORDS AN HOUR NOW TRANSMITTED BY TELEGRAPH.

THE problem of automatically transmitting telegraphic characters and printed letters has engaged the serious attention of inventors for the past twenty years. Many machines of diverse types have been introduced, but few of them are more than experiments and have not come into actual use. Germany has just introduced a device by which, it is claimed, 4,000 words an hour can be sent or received in the form of telegraphic code or typewritten characters.

The accompanying pictures show the two types of machine. The photograph on this page is for transmitting or receiving typewritten characters, while that at the bottom of the opposite page receives or transmits the Morse code. In each instance the letters are first perforated in a strip of paper. The photograph shows how the telegraphic characters are punched in the thin strip of paper.

The receiving apparatus consists of a similar strip of paper, so highly sensitized that it will instantaneously receive photographic impressions. The receiver consists of a small, flat copper disk, around the edge of which have been perforated letters or characters corresponding to those punched in the transmitting strip of paper.

This disk revolves rapidly in a small box darkened like a photographer's dark room. A small electric battery causes a flash as each letter on the disk passes over the sensitized strip of paper. The flashes occur as the proper letter, under the electrical impulse of the transmitting paper, passes over the sensitized receiving paper, and the message is instantaneously photographed at a high rate of speed. The speed of transmission and receiving depends on the number of revolutions made in a minute by the transmitting disk. The faster the disk revolves, the faster the letters are photographed.

The machine was first tested when equipped with bronze wire for the electric current acting between transmitter and receiver. With the bronze wire it was possible to send a message 620 miles. Iron wire was also used in an experiment, but it did not respond efficiently

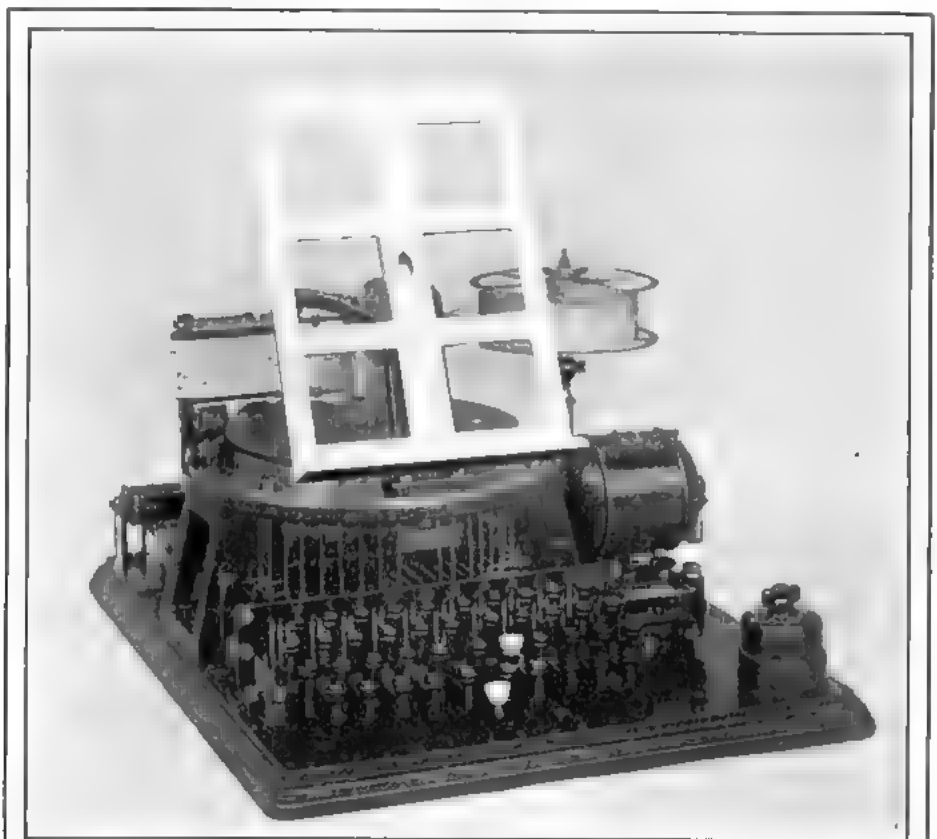
to the current. Several of these machine telegraphs and teletypewriters, as each type is called, have been installed in Berlin and are handling a large number of messages at a reduced rate.

Though automatic telegraphy has been an object of many experiments for the last two decades, it is not generally known that one of the first and what is perhaps an absolutely practicable machine was invented almost twenty years ago by Patrick Delaney, an American telegrapher. With his machine it is possible to send 1,000 words a minute, and the most expert telegraphers in this country declare that the machine is as practicable as the ordinary key of hand telegraphy

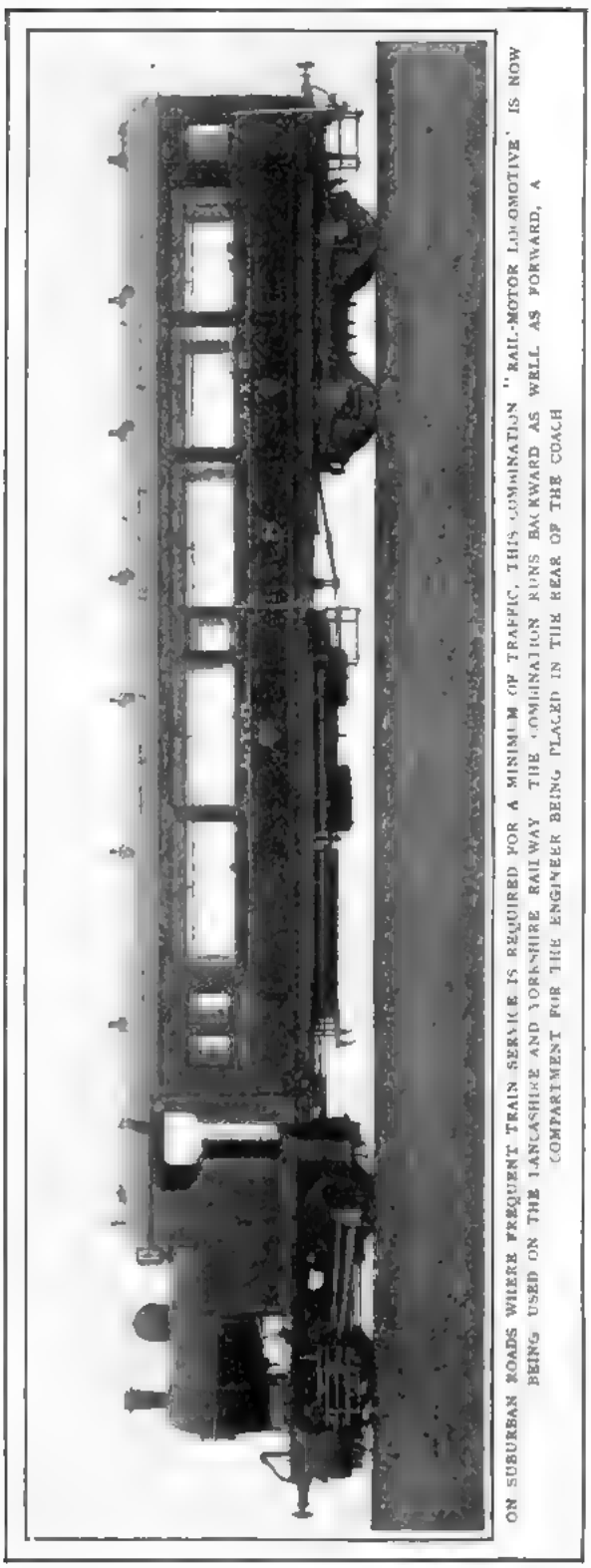
The inventor endeavored to introduce his machine, but it was opposed by certain interests, and for several years it was nothing more than a Patent-Office record. Finally, however, Mr. Delaney succeeded in interesting a capitalist, who, after much deliberation, offered to exploit his invention and compete with the telegraph companies. The capitalist was a prominent millionaire coal merchant. He owned large piers, ships, numbers of coal-cars, and was closely affiliated in business with the railroads

Soon after it became known in the inner circles that he was the power behind the greatest competitor hand telegraphy ever confronted, the condition of his coal business changed. Banks exhibited a strange indifference toward his accounts and his coal-cars were mysteriously delayed

He had already signed a tentative contract to finance the machine telegraph, but on the day on which the final arrangements were to be made he was obliged to withdraw from the affair because his coal business had suffered severe losses.



THE MESSAGE IS RECEIVED ON THIS MACHINE. THE PERFORATED SLIP INDICATES THE CHARACTERS TO BE TAKEN DOWN BY THE TYPEWRITER. THE REGULAR MORSE SYSTEM MAY BE USED



ON SUBURBAN ROADS WHERE FREQUENT TRAIN SERVICE IS REQUIRED FOR A MINIMUM OF TRAFFIC, THIS COMBINATION "RAIL-MOTOR LOCOMOTIVE" IS NOW BEING USED ON THE LANCASHIRE AND YORKSHIRE RAILWAY. THE COMBINATION RUNS BACKWARD AS WELL AS FORWARD, A COMPARTMENT FOR THE ENGINEER BEING PLACED IN THE REAR OF THE COACH

NEW TYPES OF BRITISH

Combination Engine and Coach for Suburban Traffic, and Stocky "Goat" to Push Heavy Trains.

AMONG the latest developments in British suburban railroading is a combined locomotive and coach, a photograph of which is presented on this page. The combination is called a "steam rail-motor locomotive." It is used on branches running through sections where it is necessary to have frequent service although traffic is not sufficiently heavy for the use of an ordinary locomotive and several cars. The engines are built separately from the cars and can be detached in half an hour. The cylinders, which are outside, are 12 inches in diameter and have a 16-inch stroke. The Walschaerts valve-gear is used. The car can be operated from either end, a driver's compartment being provided at the end of the coach. An average speed of 35 miles an hour is maintained, notwithstanding the fact that stoppages are numerous and that gradients of 1 in 40 and 1 in 50 are frequently encountered.

These trains stop at a number of "halts," as the British depots, where proper platforms are not provided, are called and collapsible steps at each doorway, operated by vacuum cylinders, are used at these stops.

Weighs 48 Tons.

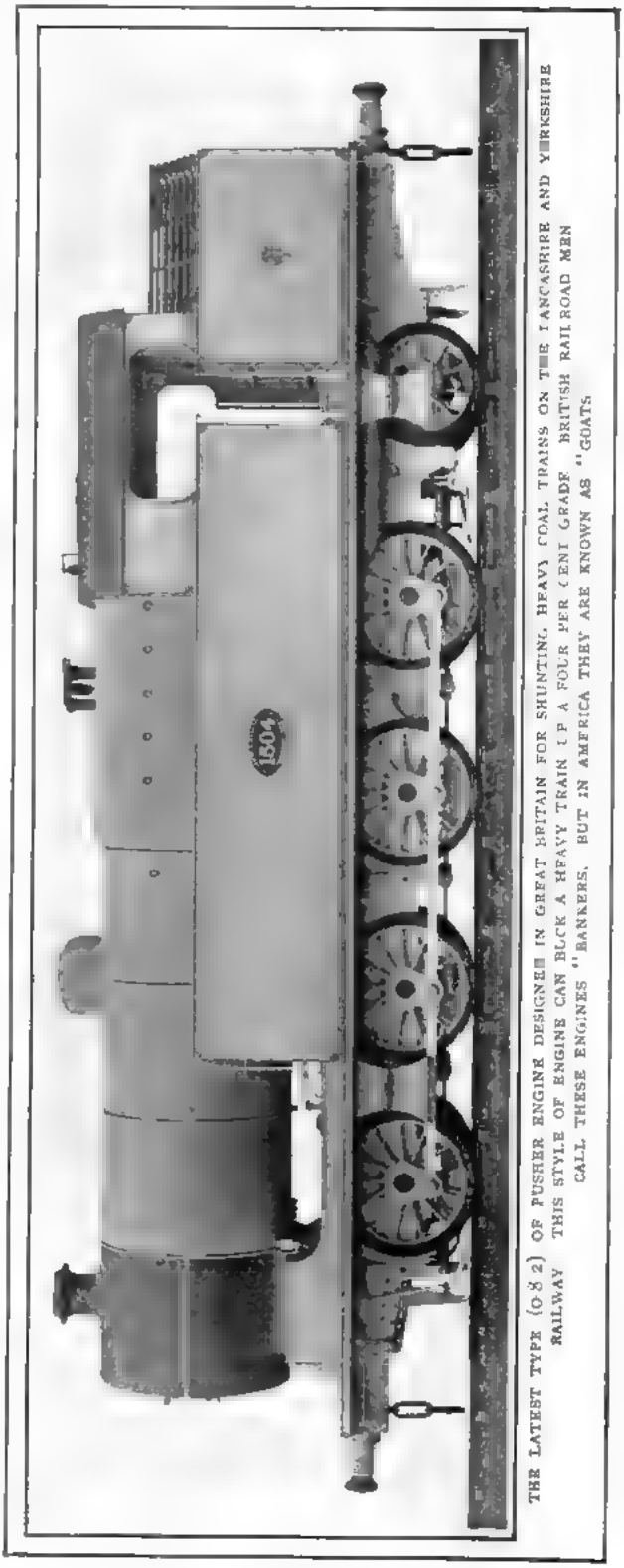
This type of rail-motor was designed by G. Hughes, chief mechanical engineer of the Lancashire and Yorkshire Railway, and was built at the Horwich Works. The leading dimensions are: Length over buffers, 60 feet 5 inches; length of car-body, 47 feet 6 inches;

ENGINE PRACTISE.

width of car-body (outside), 8 feet 6¾ inches; height from roof to floor, 8 feet; height from rail to roof, 12 feet 4⅜ inches. The total wheel base is 54 feet 8 inches and the diameter of the engine-drivers is 3 feet 7⅝ inches. Other dimensions are as follows: Cylinders, 12 inches; stroke, 16 inches; diameter of boiler, 4 feet 3 inches; length of fire-box, 2 feet 8⅝ inches by 3 feet 5⅞ inches; height of fire-box, 4 feet 3¼ inches; number of tubes, 199; working pressure, 180 pounds to the square inch; capacity of water tank, 550 gallons; capacity of coal bunker, 1 ton; total weight, complete, 48 tons.

The Bucking Banker.

The type of engine shown on this page is a recent result of British locomotive practise. It was built specially to serve as a pusher. In Great Britain this type of locomotive is known as a "banker." Heavy trains are "banked up the grade." The new locomotive is of the 0-8-2 type, with coupled drivers. It has the following dimensions, which should prove of considerable interest to those who are interested in locomotive practise in this country: Drivers, 4 feet 6 inches; diameter of cylinders, 21½ inches; stroke, 26 inches; rigid wheel-base, 16 feet 11½ inches; total wheel-base, 24 feet 6 inches; number of tubes, 295; diameter of tubes, 2 inches; heating surface, tubes, 2,008 feet; fire-box, 190 feet; grate area, 250 square feet; weight in working order, 17 tons; water capacity 3,000 gallons; coal capacity, 3 tons.



THE LATEST TYPE (0-8-2) OF PUSHER ENGINE DESIGNED IN GREAT BRITAIN FOR SHUNTING HEAVY COAL TRAINS ON THE LANCASHIRE AND YORKSHIRE RAILWAY. THIS STYLE OF ENGINE CAN BLOCK A HEAVY TRAIN UP A FOUR PER CENT GRADE. BRITISH RAILROAD MEN CALL THESE ENGINES "BANKERS," BUT IN AMERICA THEY ARE KNOWN AS "GOATS."

BUILDING-BRIDGE THAT WALKS THROUGH DEEP WATER.

A "BRIDGE" that really walks through the open sea has been invented by an Englishman. It is the talk of construction companies in Europe. Its simplicity of make cannot but make one wonder why it was not conceived prior to this time

The machine is composed of eight legs and as many feet. Only four, however, are required to set the machine "walking." There are two massive steel framework structures, one inside the other, each being supported by four feet. The outer structure is square, while the inner is rectangular. The sides are unequal, the outer, of course, being larger than the inner.

The legs of the machine can be moved up and down vertically for a considerable distance. These are fitted at the corners of each stage and are pointed at the lower ends to secure a firm grip on the rocky sea-bed.

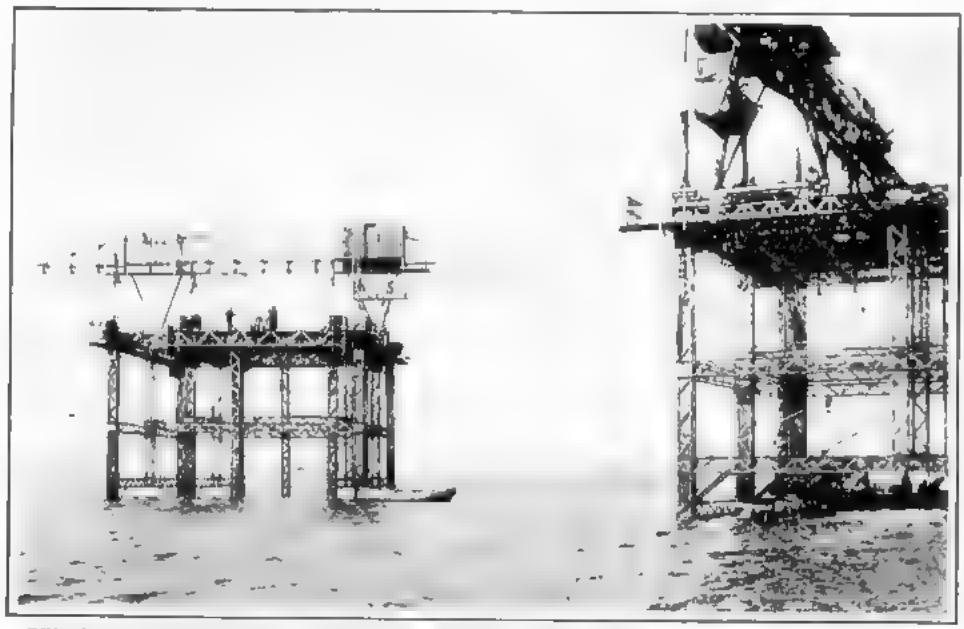
If the machine is working on sand the pointers are substituted by flat surfaces resembling large snow-shoes. This is to prevent sinking in an unstable bottom and to secure a firm foothold. Two opposite sides of the outer frame are fitted with a rolling frame which can move to and fro the full distance of the side. This carries a frame stretching transversely across the outer stage and to which the two longer sides of the inner stage are connected by a rolling frame, enabling the inner stage to travel in either direction the full space within the outer stage. The result is that this combination of movement in either direction enables the inner stage to travel all over the area bordered by the outer stage, so that it gains a little when actually in operation.

The walking action is secured as follows: The outer frame has its four legs lowered until the spuds, or feet, secure a grip in the sea-bed. The legs of the inner stage are then raised to clear all obstructions, then they are moved forward the full extent of their travel, which brings the inner stage against the forward end of the outer stage, when its legs are lowered to the bottom.

The legs of the outer stage are then

SEA GOING BRIDGE ALONGSIDE A WHARF. THE BRIDGE IS NOT CONNECTED WITH THE WHARF IN ANY WAY OTHER THAN BEING MOORED TO IT AS IF IT WERE AN ORDINARY STEAMER.

Photograph by Frank M. Evans, New York



THIS PICTURE SHOWS TWO OF THE WALKING BRIDGES PASSING EACH OTHER IN THE OPEN SEA THEY TRAVEL IN ROUGH OR CALM WEATHER WITH EQUAL EASE

elevated vertically so that it now rests upon the inner stage. The outer stage is now moved forward until the inner stage is brought into contact with the rear end of the outer stage. The legs of the outer stage are then lowered, those of the inner raised, and the same cycle of operation repeated.

It is obvious that by this alternate movement of the inner and outer stages the machine proceeds on its journey. When the end is reached the eight feet rest on the sea-bed and hold the structure rigid.

The machine is operated electrically and can be managed easily. Its rectangular form causes it to rest firmly on whatever it treads.

The machine is quite a massive affair. The outer frame is 48½ feet square. It stands 33 feet high from the bottom of the spuds to the working deck. The inner stage is 29½ feet by 40¼ feet, so that the machine can make a forward stride of about ten feet, while the inner stage can move sidewise about three feet. The feet are raised and lowered by screw gearing driven by electric motors.

A complete movement forward can be effected in fifteen minutes.

By this traveling stage work can be continued in the roughest weather, due to its tough construction.

The wear and tear due to waves is almost nothing.

SEND ALONG YOUR GOOD IDEAS.

WE want ideas accompanied by illustrations for the Current Mechanics Department of this magazine. We want ideas that have something back of them. Ideas that are new and original that may be worked up into something useful and practical. We want ideas that cover every phase of human endeavor. We will pay promptly for any that are acceptable. Unless accompanied by stamps, manuscripts or photographs will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

THE LARGEST BRICK-AND-STONE BUILDING EVER MOVED.

THE largest steel and brick building ever moved in this country from one site to another is the three-story Commercial High School of San Francisco. Although the city erected the building only two years ago at a cost of $300,000, it contracted to pay $151,000 for its removal two and a quarter blocks. San Francisco is to have a new civic center embracing several blocks adjacent to the site of the old city hall which was destroyed by the fire of 1906.

There will be a new city hall. It will cost three or four million dollars. There will also be an auditorium for public meetings and conventions, a municipal opera house, a public library, and several other buildings all surrounded by a park.

The Commercial High School stands in the way of all this improvement and must go. The building weighs 8,000 tons and is three stories high. It is 120 by 140 feet square. Its steel work is encased in yellow brick

To move it is some job. If one side were tilted even two inches a crack in the brick-work would result in heavy loss to the contractors. If the sewers or cellars over which the building is moved should cave in, the whole structure might be strained beyond repair. The contract stipulates that the building must be delivered right side up with care or another one provided by the contractors

THE COMMERCIAL HIGH SCHOOL BUILDING OF SAN FRANCISCO, A STRUCTURE OF BRICK AND STONE 120 X 140 FEET SQUARE, BEING MOVED TO A NEW SITE. THE BUILDING WAS PLACED ON ROLLERS AND HAULED BY HORSES TWO CITY BLOCKS IN NINETY DAYS

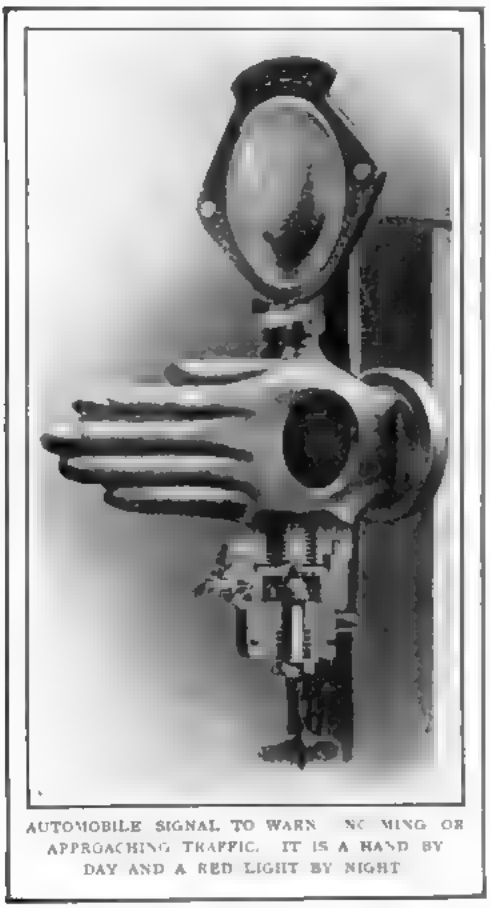
The hardest part of the job is the construction of the "track." A foundation of heavy timbers is laid two feet in the ground. Upon this rest 12 x 12-inch stringers along which steel plates are laid

Two thousand small steel rollers are inserted between the plates and the steel faced timbering underneath the building

Horses hitched to windlasses supply the motive-power and tug at five miles of hawser. One million feet of lumber is used, 150 tons of steel, and 120,000 wooden wedges.

NOVEL MOTOR-CAR SIGNAL.

YOU have often seen the chauffeur and occupants of a motor-car stretch out their hands whenever it is necessary to warn oncoming or approaching traffic that a turn is to be made or that it is necessary to make a halt. Here is a mechanical hand that saves a lot of trouble and performs the work of a human being with equal precision and accuracy. The device is actuated by a small lever on the steering-wheel. The hand may be turned at varying degrees to right or left or be kept parallel to the course, pointing forward or backward — showing whether the motorist intends to proceed or reverse. Above the hand is a mirror, which is rotatable and which can be used for rear observation. The circle in the hand is for illumination at night. An electric light is used automatically. A red disk is generally used at night



AUTOMOBILE SIGNAL TO WARN ONCOMING OR APPROACHING TRAFFIC. IT IS A HAND BY DAY AND A RED LIGHT BY NIGHT

BY USING THIS SIMPLE AND ORNAMENTAL FOLDER YOUR UMBRELLA WILL ALWAYS HAVE A NEAT, TIGHTLY ROLLED APPEARANCE

KEEP YOUR UMBRELLA TIDY.

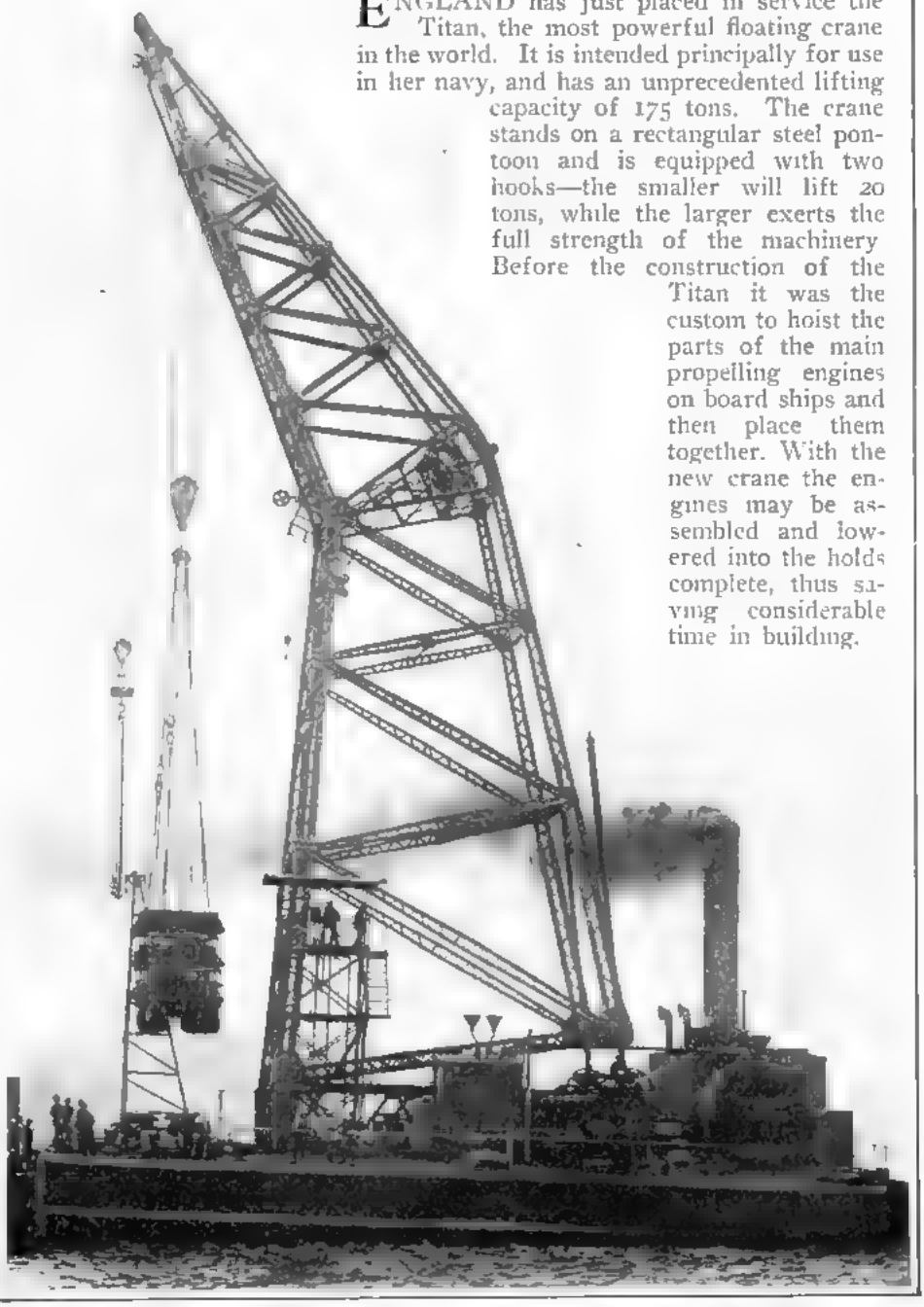
AN umbrella is always neatly and tightly rolled when you purchase it, but after it has been used a few times it seems impossible to roll it into its original state. In order that this may be accomplished a folder, or roller, has been produced, consisting of an aluminum tube neatly covered in leather on which the initials or monogram of the owner may be engraved. In using the folder hold it tightly in one hand, while with the other you insert the lower end of the umbrella. Slowly turn the folder and the umbrella slides through until it is completely rolled up. The result is a close, neat fold

SAWDUST PUTS OUT FIRES.

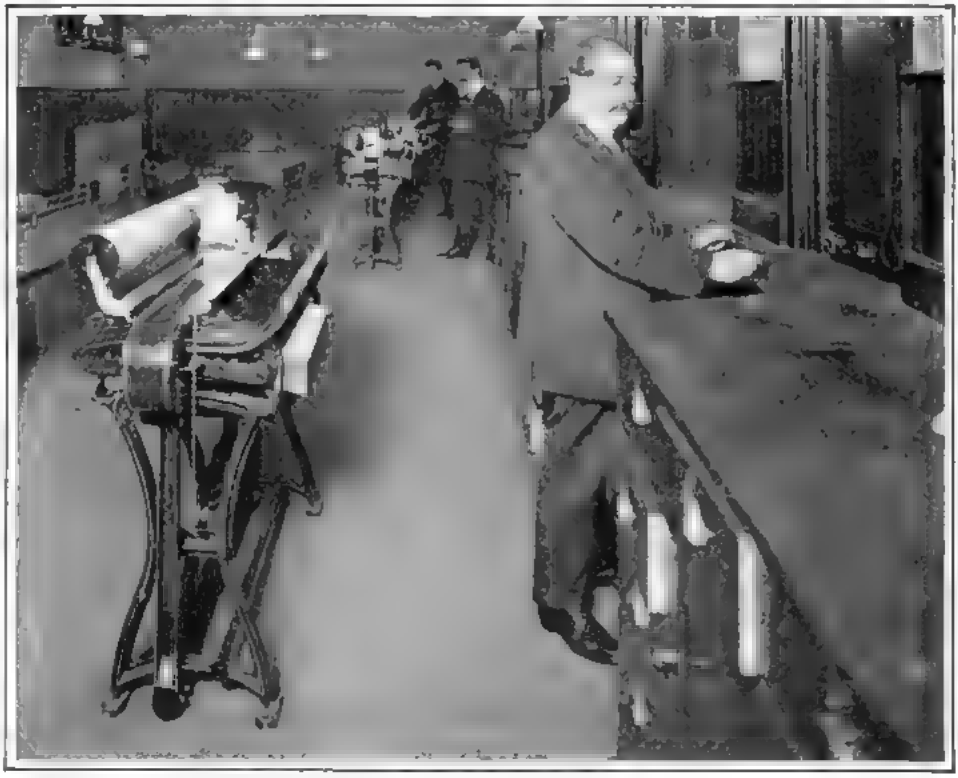
SAWDUST scarcely suggests itself as a suitable material for extinguishing fires, but from the account of some experiments by Mr. E. A. Barrier, a Boston engineer, it would appear that it possesses some special merits when dealing with small outbreaks of liquid combustibles, such as lacquer and gasoline, which are usually difficult to extinguish by ordinary means, says *The Mechanical Engineer*.

LIFTS A MAN-O'-WAR'S ENGINE WEIGHING 150 TONS.

ENGLAND has just placed in service the Titan, the most powerful floating crane in the world. It is intended principally for use in her navy, and has an unprecedented lifting capacity of 175 tons. The crane stands on a rectangular steel pontoon and is equipped with two hooks—the smaller will lift 20 tons, while the larger exerts the full strength of the machinery. Before the construction of the Titan it was the custom to hoist the parts of the main propelling engines on board ships and then place them together. With the new crane the engines may be assembled and lowered into the holds complete, thus saving considerable time in building.



THIS CRANE, OF GIGANTIC POWER AND SIMPLE MECHANISM, WAS SPECIALLY BUILT TO PICK UP A MAN-OF-WAR'S ENGINE INTACT AND LOWER IT INTO ITS PLACE IN THE VESSEL'S HOLD. SUCH AN ENGINE WEIGHS ABOUT ONE HUNDRED AND FIFTY TONS.



TICKET-PRINTING MACHINES INSTALLED IN THE RAILROAD STATION AT BIRMINGHAM, ENGLAND. THEY NOT ONLY PRINT THE TICKETS AS THEY ARE WANTED, BUT KEEP AN ACCURATE ACCOUNT OF ALL TICKETS SOLD

YOUR RAILROAD TICKET PRINTED WHILE YOU WAIT.

THE pigeon-hole method of issuing railway tickets, in general use nearly everywhere at the present day, appears to be entirely satisfactory. The passenger asks for a ticket, the clerk selects one from his stock with the name of the passenger's destination printed upon it, stamps it with the date and place of sale, and hands it to the passenger, who pays and starts on his journey. But this is only the part of the ticket-agent's duties with which the general public is familiar. The business of selling transportation involves much more than the mere issuing of the tickets

In the first place, tickets must be printed and a careful account kept of those sold. At the conclusion of his working day the clerk is faced with the much more severe task of ascertaining how many tickets he has sold and their total value in order to balance his cash. This, by far, is the most tedious part of his work. In the case of rate alterations, all tickets must be taken back by the printing department and credited to the booking office, thus giving rise to a considerable amount of bookkeeping in balancing accounts between these departments.

In order to obviate the necessity for all this work, and to facilitate the rapid sale of tickets, there recently have been installed in the Snow Hill Station, Birmingham, England, eight new ticket-printing and selling machines which not only print the tickets as they are wanted, but keep an accurate account of all tickets sold and of their value as well.

Each machine consists mainly of a carriage containing the printing mechanism, which is placed over a magazine of electrotype blocks up to 2,000 in number

one for each kind of ticket to be issued

When the carriage has been moved over the required block indicated by a pointer, a lever on the carriage is depressed, and this operates mechanism which causes the block to be lifted from the magazine past an inking roller and into the carriage.

The lever also causes the block to be pressed against a blank ticket which has been inserted in the machine, and the printed ticket then is thrown out. The return movement of the lever replaces the block in the magazine.

In addition to the destination and other particulars which may be included on the block, the date of issue and a consecutive number also are printed. The block also contains the price of the ticket.

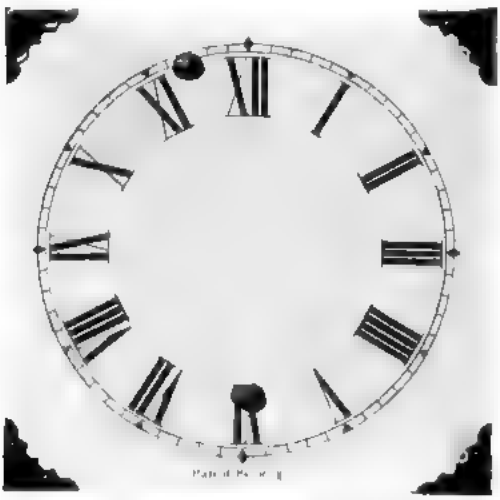
This is printed on two paper tapes. One of these is accessible by the clerk so that he may ascertain the total value of the tickets sold, but the other is locked in its case and may be handled only by the auditor.

The magazine of blocks also is secured so that individual blocks can be used for printing only through the machine. The advantages claimed for the machine are that it prevents fraud and entirely obviates the necessity for maintaining a stock of printed tickets and the consequent bookkeeping, while a considerable amount of time is saved in checking the tickets sold.

Since the station has been equipped with the machines the total number of tickets issued in one month has been as high as 68,000. As many as 295 tickets have been sold by one clerk in twenty-four minutes, and it is possible to issue up to 900 tickets an hour when the variety is not too great.

Since the introduction of the machines it has been found possible to reduce the working time of each clerk by over three hours a day, as the former bookkeeping work is now unnecessary.

CORRECT TIME OF DAY TOLD ON A CLOCK BY BUGS.



BRAZILIAN GOLD BUGS TAKE THE PLACE OF A CLOCK'S HANDS AND TELL TIME ACCURATELY.

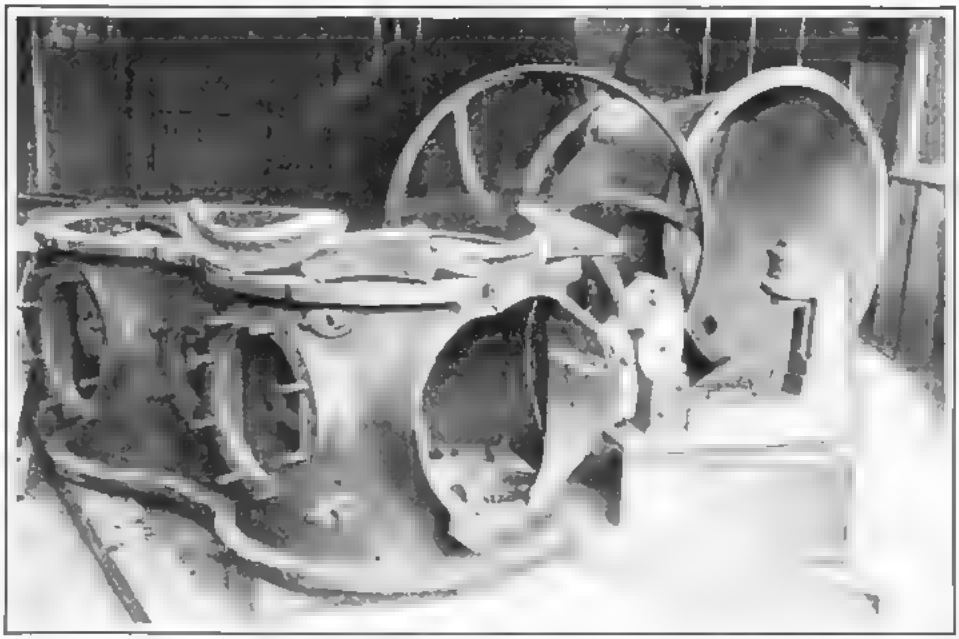
STRANGE stories are told of wonderful trained fleas that exhibit astonishing intelligence in driving minute carriages and performing other equally surprising tasks, but bugs that tell time now take place among insect wonders.

The bug clock consists of an ordinary dial without hands. One bug indicates the minute and the other the hour. They are so arranged that they may pass one another on the dial without interference The "minute" bug, of course, travels twelve times as far as the "hour" bug in the course of a day, but at all times they tell the time as accurately as any ordinary clock.

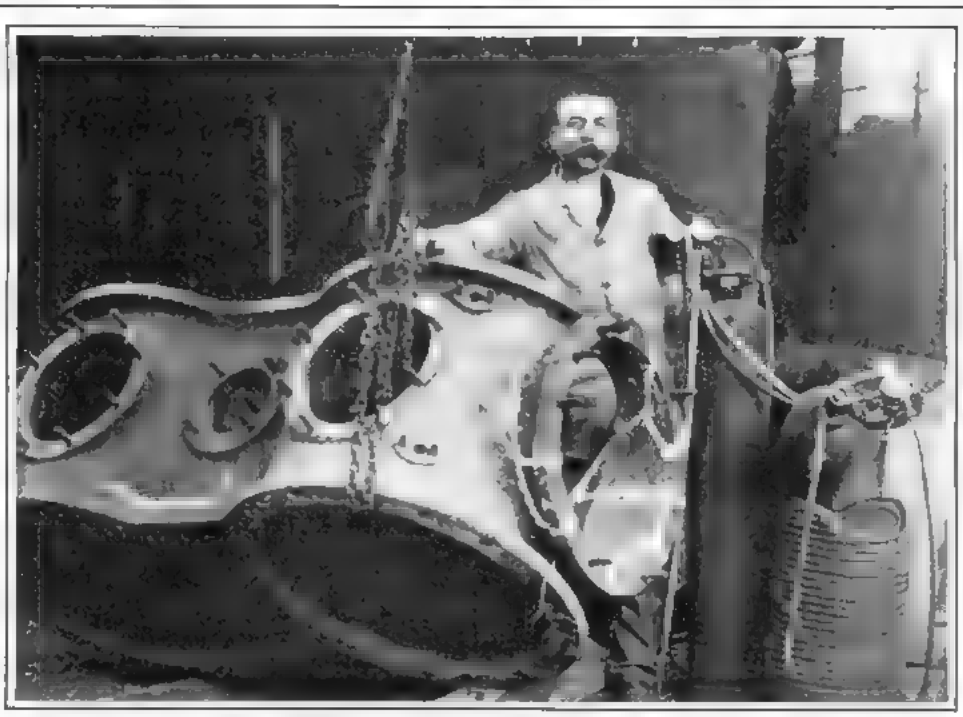
It is very mystifying to watch one bug move from minute to minute, while the other, at less than a snail's pace, moves slowly ahead to point the hour. Astounding as it may appear, it is very simple. The bugs are real Brazilian gold bugs, but they are dead and as dry as a wafer. Through their bodies has been thrust a small steel needle. Under the dial shown in the photograph is a real clock with magnetized hands. The magnetic attraction of these hands is quite sufficient to hold the needles in place and, as the hands move slowly around, the bugs are drawn with them.

Bug clocks have been placed on exhibition in many windows in New York City and have caused considerable discussion, for, simple as they are, few people realize the means by which the little insects are apparently trained.

BROKEN CASTING PERFECTLY WELDED BY ACETYLENE.



THE SHATTERED CASTING BEFORE THE BROKEN PARTS WERE WELDED TO THE MAIN PIECE.



THE WHITE LINES SHOW WHERE THE BROKEN PARTS WERE SOLDERED FAST BY THE TERRIFIC FLAME CAUSED BY A COMBINATION OF OXYGEN AND ACETYLENE GAS AND APPLIED THROUGH A BLOW PIPE

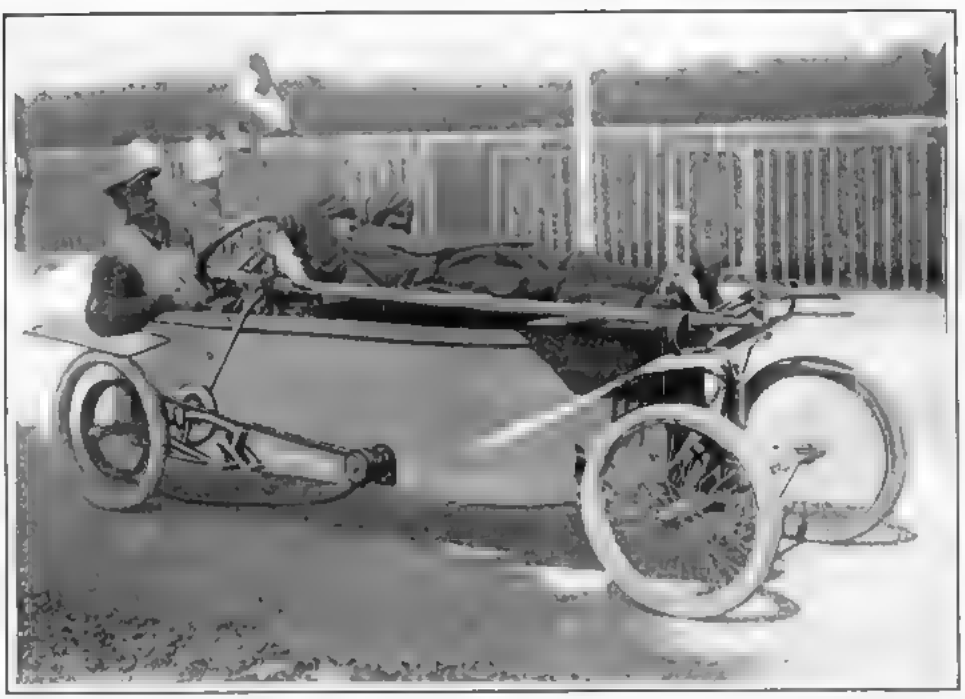
MOTOR-AMBULANCES FOR THE RED CROSS OF FRANCE.

IN Europe, where many of the real novelties in self-propelled vehicles originate, army authorities have appreciated the value of motor-propelled wagons more quickly than their American cousins, and this is particularly so in France and Germany, and latterly in Italy. Motor-trucks now are used in practically every field where the horse-drawn truck once held unchallenged sway. They have made a field that is absolutely impossible of invasion by horses.

It is quite within the scheme of things that army authorities should turn naturally to the self-propelled ambulance. It constitutes a means of transporting sick or wounded men that is more rapid than the horse-drawn vehicle, and, at the same time, it holds forth immeasurably greater possibilities for increasing the comfort of passengers. The motor ambulance is heavier than the horse-drawn type and, therefore, it can be better sprung. As there is not the weight restriction with the motor ambulance that there is with the other, the capacity of each machine can be proportionately increased. None of this takes into account, of course, the possibility of sickness or accident—always a hazard where horses are used.

Among the ambulances that have been developed for special work there are a number of novel vehicles that have more than proven their worth in recent army maneuvers in both Germany and France. One of them is virtually a surgery on wheels and is equipped with all the apparatus of the modern high-class operating-room in a hospital.

In external appearance this traveling hospital appears exactly like a large motor van, and easily might be mistaken for one except for the fact that it bears the red cross and is rather too replete with doors for any ordinary vehicle. Only when the "wings," which nomi-



FOR THE RAPID TRANSPORTATION OF INJURED INDIVIDUALS THIS TYPE OF MOTOR-AMBULANCE HAS PROVEN PARTICULARLY VALUABLE. THE STRETCHER IS MOUNTED ON A NEW TYPE OF VEHICLE WHICH HAS BEEN STYLED THE "CYCLE CAR." THE MUNICIPAL AUTHORITIES OF PARIS ARE CONSIDERING THE ADVISABILITY OF USING THESE CARS TO CONVEY INJURED CITIZENS TO EMERGENCY HOSPITALS.

nally are carried strapped to the sides, are spread out, does it take on semblance of its true significance.

The tents at the sides, or the "wings," as they are styled, serve to house the doctors when the vehicle is in the field. There are doors at both sides to provide communication between the tents and the hospital, and the large double doors at the rear serve as the main entrance. The driver's compartment is completely enclosed and, as the body is made of sheet steel, it is bullet-proof.

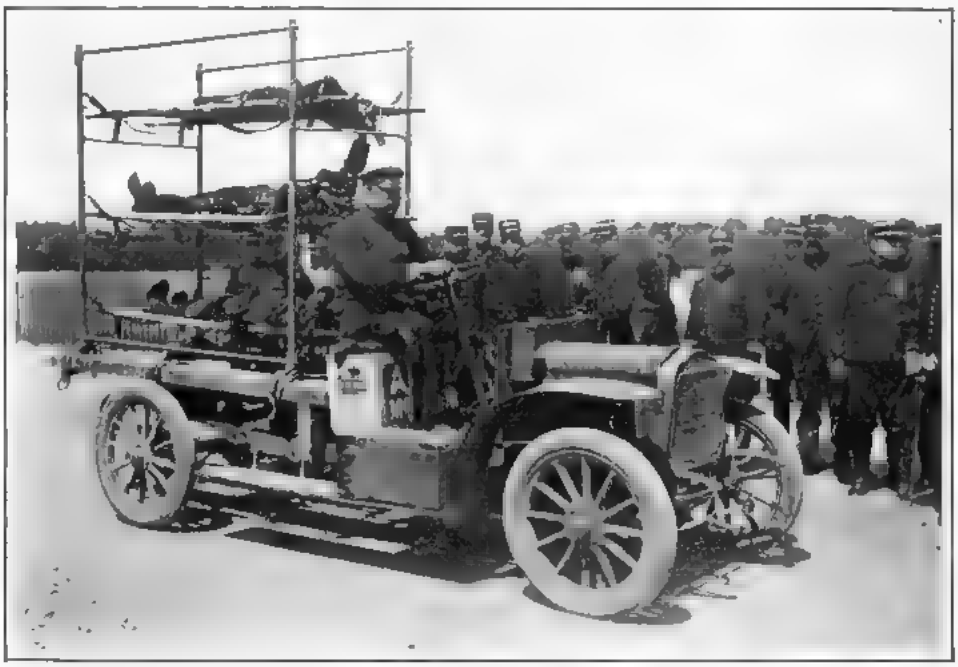
Inside the vehicle is a veritable hospital, with its white enameled walls, its medicine cabinets, and its chests of instruments. In addition to being equipped with an adjustable operating table of the most approved pattern, cots and stretchers also are carried.

In another type of ambulance that is by no means as complete a hospital, though it carries all the usual ambulance equipmen, has a capacity for no less than six wounded men.

The stretchers are removable, and when in place are supported on coil springs to ease the jar on the patients. At the sides of the body there are commodious cupboards for the storage of drugs and bandages, and beneath the lower tier of stretchers more appurtenances can be stored.

For more rapid transportation of sick and wounded soldiers a special vehicle has been developed. It was used in recent French army maneuvers. In its simplest aspect it consists of nothing more complicated than a pipe frame supported on a pleasure-car chassis. To the frame stretchers are attached by means of hooks and springs, accommodation being provided for three passengers.

A fourth type of vehicle, undoubtedly the simplest of all, has proven particularly valuable for the rapid transportation of single invalids. The car upon which the stretcher is mounted is the Bedilia, which probably was the first of the new vehicles styled "cycle-car."



MOTOR AMBULANCE DESIGNED FOR THE RAPID TRANSPORTATION OF SICK AND WOUNDED SOLDIERS. IT WAS TESTED WITH CONSIDERABLE SUCCESS IN THE RECENT MANEUVERS OF THE FRENCH ARMY. IT IS A PIPE FRAME SUPPORTED ON A PLEASURE-CAR CHASSIS. STRETCHERS ARE ATTACHED TO THE FRAME BY MEANS OF HOOKS AND SPRINGS, ACCOMMODATION BEING PROVIDED FOR THREE WOUNDED MEN

DESTROYING SPARROWS AND RODENTS BY ELECTRICITY.

THE extermination of the English sparrow is a problem that has concerned many people of America who have found the little gray-feathered scavenger more a pest than a thing of beauty. Perhaps every available method has been used without success; but in a community where the sparrow has driven the song bird from his annual haunts a horticulturist who felt the need of maintaining bird-life to destroy the insects that infest his trees has hit upon a successful plan of killing the birds by electricity

THE ELECTRIC TRAP FOR THE EXTERMINATION OF SPARROWS. IT CONSISTS OF TWO COPPER PLATES, ONE OVER THE OTHER, SEPARATED BY CONTACT SPRINGS. THE SLIGHTEST PRESSURE MAKES THE UPPER PLATE "LIVE."

The trap consists of two copper plates placed one upon the other and separated by three contact springs. Each plate is attached by copper wires and each is coupled to a powerful accumulator. At the slightest pressure on the upper plate the contact is started and the plate becomes "live." A small receptacle is fixed on the upper plate, in which crumbs or seed may be placed for bait The moment the birds alight on the trap to pick the tempting morsel they are electrocuted by the current

A correspondent of the *Electrical Review* tells as follows about killing rats by electricity:

"A large square piece of tin, having been cut so as to leave a hole about 1.5 inches square in the center, was placed near a runway. A bait of meat was placed in the center. The two poles of a 1,000-volt, 60-cycle source of alternating current were connected to the meat and to the tin respectively. The same thing was later tried using 500 volts direct current. I remember that a rat sampled the bait each time; I was so informed by a very surprised and loud squeal; and one time the rat either was thrown or blindly ran against a pail a few feet from the trap. I next made a box about four inches deep, covered the bottom and lined the edges with metal. The 1,000-volt source was connected to the points and bait was strewn on the bottom. A rat climbed into this, fell in, squealing, jumped out, and ran away All of these rats were gone when I reached the place. After this I was not troubled less with the rodents, but was unsuccessful in further attempts to cultivate their appetite for electricity. I have nearly first-hand knowledge of a rat which had a very thorough treatment with 220-volt, 25-cycle alternating current This rat was caught in a trap consisting of a wire cage that was connected to one side of the circuit."

FRENCH HANDCUFF, "LA MENOTTE," A TOOL OF TORTURE.

THE police of the larger cities of France do not use ordinary handcuffs which slip tightly over a prisoner's wrists and are held fast by lock and key Their particular form of "wristlet" is the *menotte*, a knotted chain with a small wooden handle at either end. It is quickly placed around a prisoner's wrist, the handles being gripped tightly by the arresting officer, while the chain runs between his fingers. With the least resistance it can be easily tightened, producing a stinging torture. The *menotte* is made of steel and wrought-iron links and is about one foot long

THE FRENCH HANDCUFF IS A VERY SIMPLE DEVICE PERHAPS THE AMERICAN POLICE WHO ARE USED TO THE STRONG STEEL "WRISTLETS" THAT LOCK AUTOMATICALLY WOULD OBJECT TO THIS FORM OF MANACLE, BUT THE FRENCH AUTHORITIES CLAIM THAT THE EXQUISITE TORTURE IT PRODUCES BY TWISTING MAKES IT LA GRAND SUCCES

The handcuff is a very necessary implement in the protection of policemen in arresting desperate criminals. Different types are in use all over the world In the police headquarters of the larger cities are many specimens of handcuffs, and usually there is a small exhibit of the tools used by burglars, safe-blowers, pickpockets, and housebreakers generally

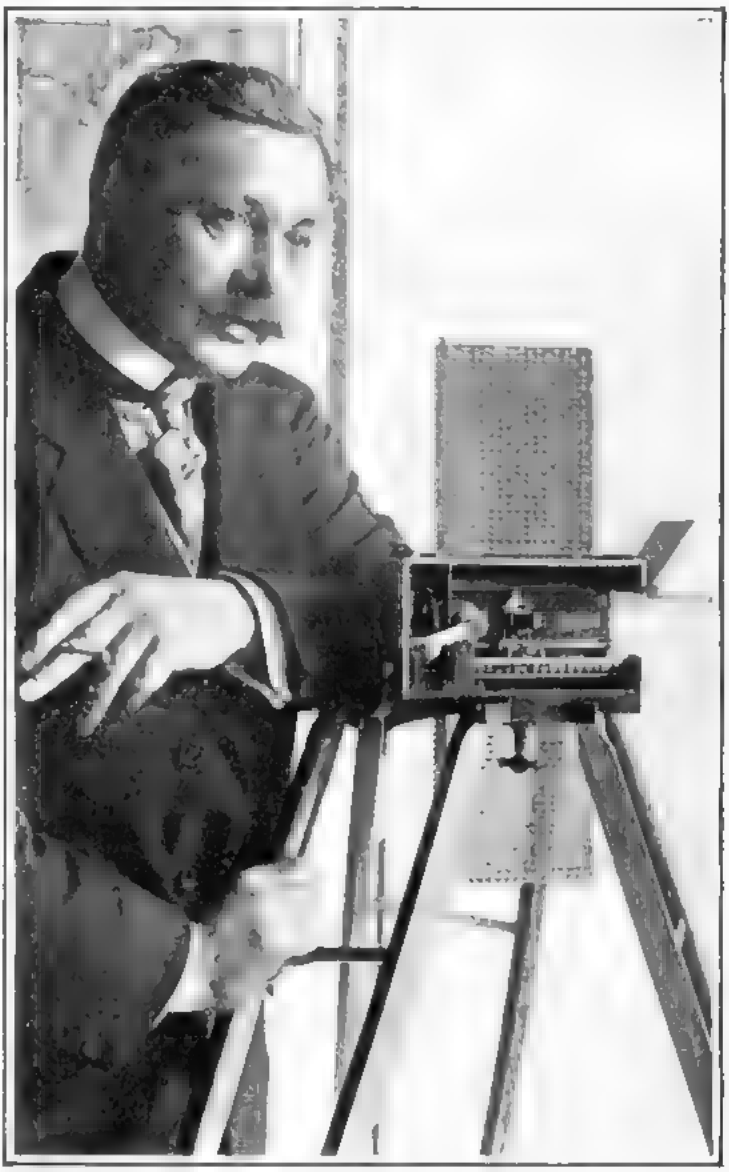
As some of the tools cannot be purchased in the open market, the thief is obliged to make them himself secretly Much ingenuity and patience is shown in the production of these various tools

In New York City alone there are about seven thousand men in the police department. Police, as we understand the word, did not exist in ancient times Normans who settled in northern France were the first to establish anything resembling a real police force. From this beginning the idea spread throughout the world, and to-day the uncivilized are the only peoples who have not created some system for detecting crime.

THE MENOTTE IN USE SHOWING HOW IT IS SLIPPED AROUND THE PRISONER'S WRIST AND HELD BY THE OFFICER

CLAIMS GLASS FILM FOR "MOVIES" IS FIREPROOF.

THOUGH the moving picture is so widely popular and in general use, it presents one problem which is the subject of many experiments—the problem of producing a fireproof film. Celluloid is combustible and liable to cause fires, and attempts are being made in this country and Europe to discover some satisfactory substitute. An Italian inventor, Gianna Bettini, suggests the use of glass plates similar to those used in the stereopticon, but much larger and having many exposures. His idea is shown in the accompanying photographs. The picture on this page shows his method of projecting the pictures on the screen, while the opposite picture shows a portion of his proposed plate. The machine for projecting the pictures is similar to that used to take them. The camera is so arranged that the plate is moved slightly as each picture is taken. In this way only a small part of the plate is exposed at one time. The projector holds the plate and moves it in a similar way. Each picture passes before the light in its proper order and the effect of motion is the same as that produced by the ordinary film. Bettini has not succeeded in taking long pictures, and at present his invention is being used only by a few lecturers. He is demonstrating it in Italy. The principal objection to the plate seems to be its fragility.



GIANNA BETTINI, THE ITALIAN INVENTOR, AND A SECTION OF HIS FIRE PROOF GLASS FILM FOR MOVING PICTURES

SECTION OF SIGNOR BETTINI'S GLASS MOVING PICTURE FILM SHOWING A MAN IN THE ACT OF CLOSING A BOOK. THE FIGURE MOVES FROM THE UPPER LEFT HAND SQUARE ACROSS THE PLATE, THEN PASSES TO THE NEXT FIGURE ON THE SECOND ROW, BACK TO THE LEFT AND SO ON TO THE END.

PORTABLE STEEL HOIST FOR SKY-SCRAPER BUILDING.

CONSTRUCTION TOWER OR DISTRIBUTING PLANT THAT DOES AWAY WITH THE OLD METHOD OF HOISTING MATERIALS ON CRUDE ELEVATORS THROUGH THE CENTER OF A BUILDING DURING ITS ERECTION THE OUTLINE SHOWS THE SIZE OF THE BUILDING TO BE COMPLETED THE CONSTRUCTION TOWER CAN BE PIECED TO ANY HEIGHT

THE accompanying photograph shows a concrete distributing plant recently utilized in erecting a building in Pittsburgh. These steel hoist-towers are built in fifteen-foot sections. Each tower is composed of one fifteen-foot bottom section, one thirty-inch top section with sheave wheel and frame, and as many fifteen-foot sections as are required for the height of the tower

They are conveyed to the location where they are to be used in a "knocked down" condition, all necessary riveting being finished, leaving only the bolting of angles and braces to be done on the ground. When put together the tower is strong and rigid, yet sufficiently light so as to be easily carried from one job to another

These towers are in use 200 feet in height independently of other supports than guy-wires, a set being required every fifty feet. These towers, while designed for use with special mixers, may be used in conjunction with any type of mixer. The concrete chutes in eight-foot straight sections weigh about sixty-three pounds, the eight-foot receiving sections weigh 108 pounds, and the trussed sections weigh nearly 700 pounds.

DIESEL ENGINES.

THE steam locomotive has had many threatened rivals during the past few years, and now the internal combustion motor is to be tried on the Prussian State Railways. This locomotive is the design of Dr. Diesel, and the engine has been constructed at the Winterthur Works of Messrs. Sulzer, while the underframe and gear have been built by Messrs. A. Borsig, of Berlin. The motor is of the four-cylinder type, working on the single-acting two-cycle principle, and capable of developing normally about 1,000 horse-power, though this may be exceeded. The engine drives a loose shaft, to which the two driving-wheels are coupled, the locomotive having two four-wheeled bogies.

WHEN YOU WANT TO RAZE A CHIMNEY JUST PUSH IT OVER.

ON the outskirts of Newark, New Jersey, there stood for years an old chimney, one hundred feet high—the sole remaining remnant of a deserted factory. Realizing that there was danger of its being blown over and possibly causing damage or endangering the lives of pedestrians, the owners decided to have it razed. Just how to get men to the top to tear it down brick by brick—as chimneys are usually razed—was something of a problem, and the ancient structure was hardly of sufficient value to warrant the expense of erecting a scaffolding so that it could be demolished from the top down. There was but one course open, and that was to topple it over. The base was undermined by fire until all above was merely a trembling mass. Finally, one day when a high wind was blowing and with very small effort on the part of some workmen, the fifty-ton mass was thrown over as if it were merely a house of cards.

A CHIMNEY ONE HUNDRED FEET HIGH CAUGHT BY THE CAMERA JUST AS IT WAS FALLING AFTER ITS BASIC STRUCTURE WAS WEAKENED SO THAT IT COULD BE EASILY TOPPLED OVER. THE HUGE MASS, WEIGHING FIFTY TONS, WAS CONSIDERED A MENACE AND THE SIMPLEST MEANS WERE TAKEN TO DEMOLISH IT

STEAM WASTE.

THE great avenue of waste with all steam engines is the exhaust steam, says *Railway and Locomotive Engineering*, and there is no probability that the loss of heat passing out by this channel will ever be radically decreased while steam is employed as a mode of motion. There are, however, lines of economy that may be worked on to advantage by our master mechanics and locomotive designers. Numerous minor causes of waste could be closed up by intelligent management, and the resultant saving would materially increase the economy of the engine. Even the most defective locomotive boilers in use are more efficient in giving back equivalents for the heat received than the best proportioned and best protected cylinders, yet it is easier effecting improvements on the boiler than on the cylinders. A good locomotive boiler accounts for over fifty per cent of the heat liberated from the coal; few cylinders convert ten per cent of the heat

WITH ORDINARY SLED RUNNERS, PARTS OF A MOTORCYCLE, THE STEERING GEAR OF AN AUTOMOBILE AND ONE BICYCLE WHEEL, THIS BOY BUILT A SELF-PROPELLING DEVICE FOR HIS WINTER SPORT WHICH EVEN MAKES SPEED ON AN UP GRADE

Photograph by Frank C. Perkins, Buffalo, N. Y.

HE'LL HAVE SOME FUN WHEN IT SNOWS AGAIN.

APPLICATION of the propelling principle of the motorcycle is the latest means of constructing an automatic sled. The new motorcycle sled, as it might be called, is shown in the accompanying illustration

The frame of the contrivance is mounted on two small sleds. A steering-gear is attached to the front sled in such a manner that the direction of the car may be controlled by a wheel similar to that used on automobiles. The motor-wheel is set up in the center of the frame and is actuated by a shaft driven by the seven horse-power motors.

Contrived by a motorcycle enthusiast in Columbus, Ohio, the machine was in use during the greater part of the winter and very little trouble was experienced with it. The rubber tire of the wheel sufficiently resisted the slipping effect of ice and snow and a fair speed was possible. Only in slush and very wet snow did the wheel fail to have enough adhesion. The tendency under that condition was to slip a little.

SIXTEEN-INCH GUN TO PROTECT THE PANAMA CANAL.

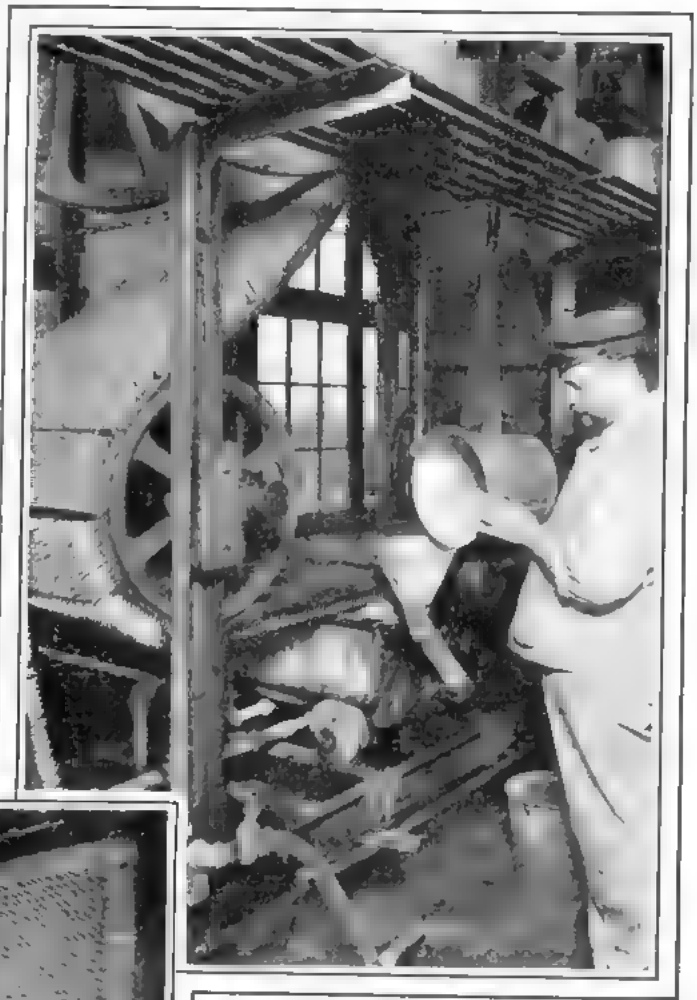
THE huge carriage for the 16-inch gun to be used in the fortifications at Panama is now being constructed at the Watertown Arsenal, New York. The carriage is on practically the same plan as the 14-inch gun disappearing type and, being intended for the largest gun, will be the largest in the world

The big gun will be placed on the top of Perico Island at the Panama entrance of the great waterway. From this elevation it can fire 2,400-pound projectiles at any enemy that might try to take possession of the canal. There is not much doubt that if a 2,400-pound projectile from the 16-inch gun strikes the largest battle-ship fairly it would easily sink such a vessel

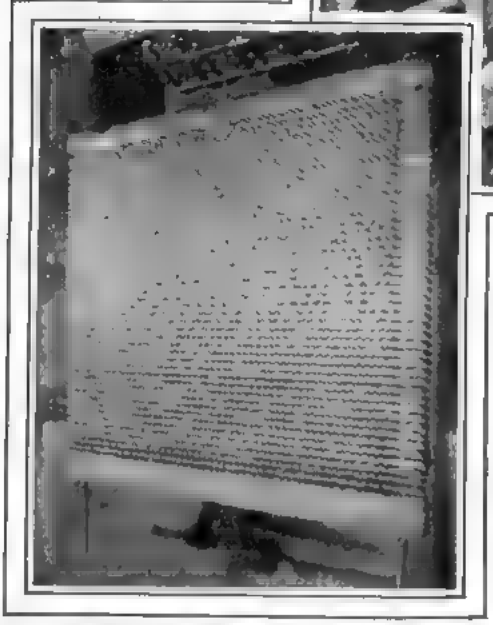
THE OLD AND NEW METHOD OF DIPPING MATCHES.

THE mechanics of matches now make it possible for one to manufacture over 10,000,000 matches a day. The contrast of the hand and machine methods of making the modern friction match is clearly illustrated in the accompanying photographs

At the bottom of this page is shown the tedious manufacture by hand. The splints, as matches are called before they are finished, were set in a frame and the exposed ends were dipped into phosphorus. The splints were then set aside to dry. Frequently it was two or three weeks before the matches were sufficiently dry to be placed on sale. A few thousand a day was the maximum output.



THE MODERN MACHINE THAT CUTS 11,000 SPLINTS A MINUTE, CARRIES THEM OVER AN ENDLESS CHAIN, DIPS THEM IN SULFUR AND FINISHES 10,000,000 MATCHES A DAY



THE OLD SWEDISH METHOD OF PLACING MATCHES IN A FRAME BY HAND AND DIPPING THEM AT THE ENDS. ONLY A FEW THOUSAND MATCHES COULD BE MADE IN A DAY AND IT WAS OFTEN NECESSARY TO WAIT TWO WEEKS FOR THEM TO DRY.

In the smaller picture is shown the very latest development in match-making machines. Little or no hand labor is necessary.

The timber is sawed into broad, flat pieces, about one-eighth of an inch thick. After these pieces have been freed of all knots and decayed spots they are placed in a machine equipped with an endless chain, which carries the wood under cutting knives. These knives are set in a cylinder about one-

quarter of an inch apart. Moving on the endless chain, the boards are fed automatically to the knives. Forty-four splints are cut in each revolution of the cylinder. The knives make two hundred and fifty revolutions in a minute, cutting out eleven thousand splints.

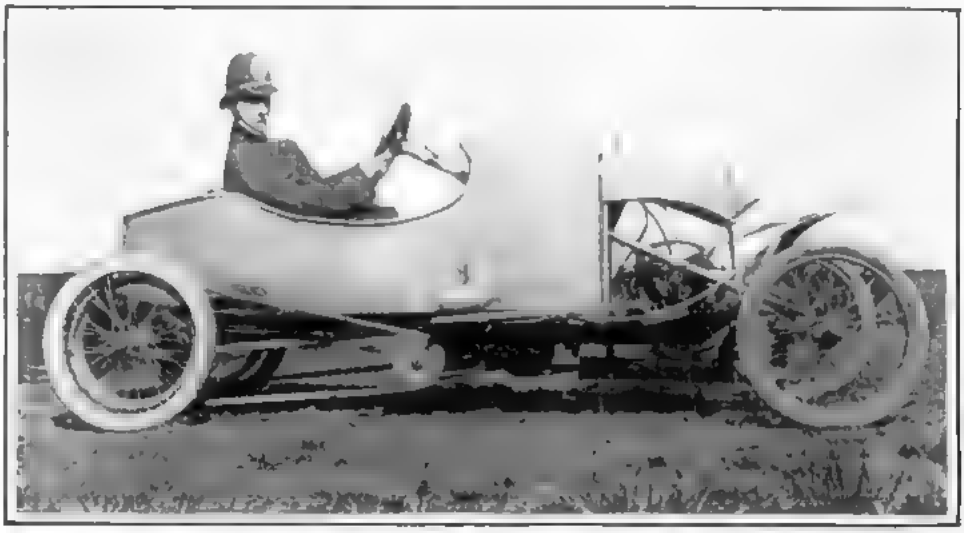
As shown in the picture, these splints are carried over the endless chain and the ends pass through the phosphorus which is fed into the machine from a pail. The dipped splints are dried by blasts of cold air and are then ready to be placed in boxes.

The manufacture and filling of match-boxes is entirely mechanical. Sheets of cardboard are fed into one end of the box-making machine and, after being formed and glued, emerge filled, a finished product, at the other end. The capacity of one of these machines is two million boxes a day. Only fifteen or twenty men are necessary to operate it, but to produce an equivalent of material by hand fifteen hundred workers would be required.

The first patent for a phosphorus friction match was taken out in this country on October 24, 1836, by Alonzo D. Phillips, of Springfield, Massachusetts. The first friction match known to the world did not appear until 1833

SPEEDY POLICE MOTOR-CARS CHASE BRITISH JOY-RIDERS.

MOTORCYCLES did not meet the requirements of the English police force, so the traffic men were supplied with the small, peculiar type of motor car shown in the accompanying illustration. The cars are low and rakish, and are driven by a belt instead of the usual gear and chain. To save time should the engine get out of order, the car is provided with an open hood, making the machinery easy of access. Several hundred of these cars are now speeding about London, chasing violators of speed laws, tracing thieves, and keeping the great traffic of London on the move. The car is equipped with twenty-horse-power engines and, being light, will travel forty miles on one gallon of gasoline. The speedy motor cycle used by the American police was tried in England, but did not give satisfaction. The small car shown in the picture can get over the ground just as quickly and with less trouble, it is claimed.



THE POLICE OF GREAT BRITAIN DO NOT TAKE KINDLY TO THE MOTORCYCLE, SO LARGELY USED IN THE UNITED STATES. THEY CLAIMED THAT THE CYCLE CANNOT BE HANDLED SO EASILY AS THE MOTOR-CAR, SO AN AMBITIOUS INVENTOR TURNED OUT A LIGHT FAST-RUNNING CAR WHICH IS SPECIALLY USED IN CHASING JOY RIDERS, RUNAWAY HORSES AND THE CRIMINALS OF THE SUBURBS.

Photograph copyrighted by Paul Thompson

UNCLE SAM OWNS AND OPERATES JUST TWENTY-ONE MILES OF RAILROAD IN THE UNITED STATES. HERE IS A PICTURE OF ONE OF HIS TRAINS. IT RUNS ON THE RECLAMATION SERVICE LINE BUILT FOR THE CONSTRUCTION OF THE ARROWROCK DAM IN BOISE RIVER CAÑON, IDAHO

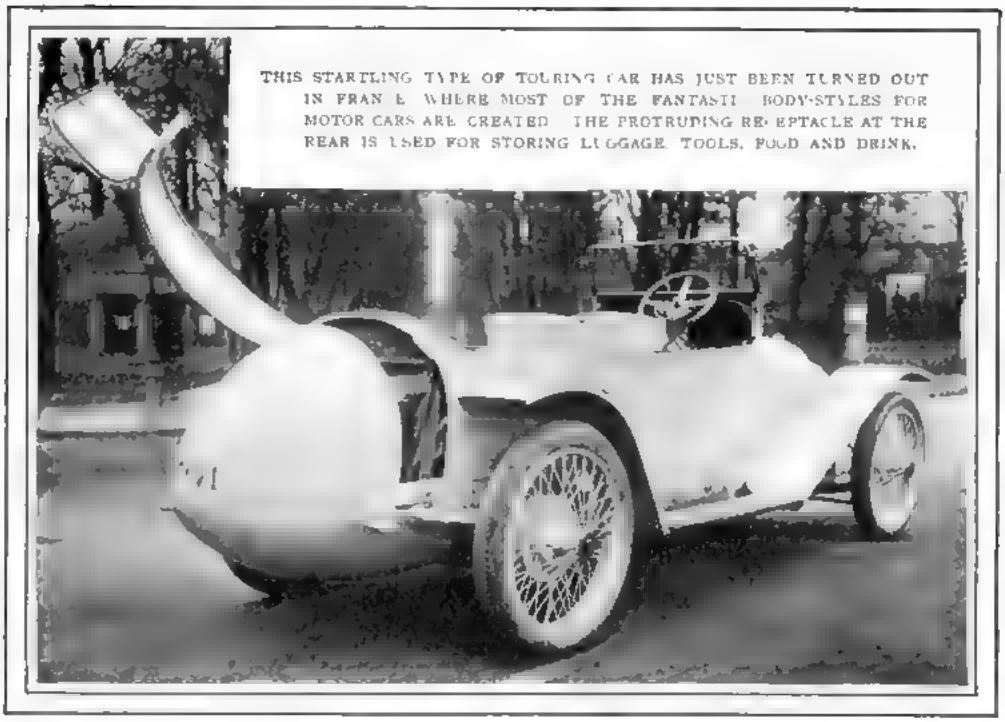
ONLY RAILROAD IN UNITED STATES OWNED BY UNCLE SAM.

UNCLE SAM owns just one railroad in the United States, boys, and has duly installed himself as super, roundhouse foreman, and most every thing else on the pay-roll. The mixed extra in the picture shows some of his rolling-stock and how he makes it up into trains. As a railroad owner he has a lot to learn. He hasn't even equipped his road with boards, blocks, sidings, and the many other things regular railroaders demand. His is just a straight-away stretch of single track, without a despatcher at either end or a way-station along the line. The system over which he presides is only twenty-one miles long. It has the distinction of being the only Federal owned and operated railroad within the continental limits of the United States. It has just been completed and is now used by the Reclamation Service. The line connects Boise City, Idaho, with the new Arrowrock dam site in the Boise River Cañon. The dam, when completed, will be 351 feet high, and will take about five years to build. During this period thousands of men and hundreds of thousands of tons of construction materials and supplies for use in the work will be hauled over Uncle Sam's railroad. The government was reluctant at first to add railroading to its other interests, but because of the temporary character of the line none of the great railway systems would undertake to build it.

NATURE'S REAL LODESTONE IS COBALT AND NICKEL.

IT has been known from time immemorial that certain natural ores of iron possessed the property of attracting iron and steel, and that these metals were themselves capable, under proper conditions, of being endowed with a like property.

This property, which is called magnetism, is also capable of being manifested, though in a less marked degree, by certain other metals, especially cobalt and nickel. Such a mass of magnetic ore is called a natural magnet, or lodestone, says *Telegraph and Telephone Age*. A mass of iron or steel to which magnetic properties have been imparted by any known means is called an artificial magnet.



THIS STARTLING TYPE OF TOURING CAR HAS JUST BEEN TURNED OUT IN FRANCE WHERE MOST OF THE FANTASTIC BODY-STYLES FOR MOTOR CARS ARE CREATED. THE PROTRUDING RECEPTACLE AT THE REAR IS USED FOR STORING LUGGAGE, TOOLS, FOOD AND DRINK.

MOTOR CAR WITH BULBOUS RECEPTACLE FOR BAGGAGE.

THE French, who are responsible for most of the fantastic body styles in motor-cars—styles that eventually find their way to American shores—point to the touring-car illustrated on this page with no little degree of pride. They claim that if it is not a thing of beauty, it is at least a thing of utility. The bulbous back is a commodious receptacle for luggage, spare tubes, tools, hampers of food and drink. The lid is simply a hinged section to which part of the mud-guard of the right rear wheel is attached. The manufacturers claim that this form of automobile reduces the wind resistance to a considerable degree. This is a factor in motor-car building that is creating considerable attention abroad.

BLOW OXYGEN INTO YOUR FURNACES AND SAVE COAL.

AFTER a number of tests made under different conditions, it has been found that there always results — according to the amount of oxygen added to the furnace draft -a gas in the blast from the furnace which has a composition of the best producer gases.

By increasing the amount of oxygen in the air from the normal of 21 per cent, and at the same time reducing the nitrogen present, the demands on the stoves are reduced about 8 per cent and the consumption of coal is decreased. In iron works, where the items of expense in blast furnaces is of the utmost importance, this 8 per cent reduction means about 6 cents per ton less in the cost of pig iron.

The volume of the gas is lessened by the lower percentage of nitrogen, and the reducing power is also reduced. The efficiency of the blast furnace is improved to the extent of 23 per cent. Eight per cent of this comes from a lowered demand on the blast, and the other 15 per cent because less coke must be burned. All of these important points direct attention to the need for additional study of the influence of oxygen in combustion economics.

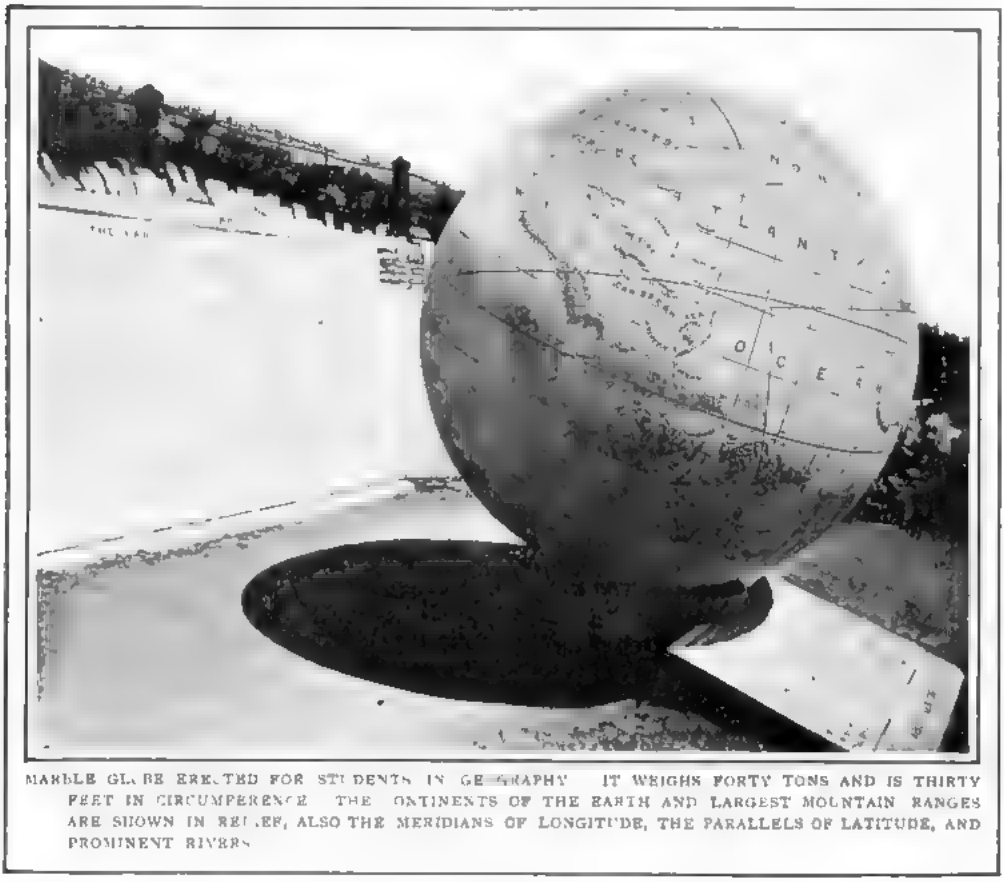
STUDENTS' MINIATURE EARTH IN MARBLE.

THE most curious geographical globe in the world rests in the form of an immense stone monument at Swanage, England. It is slightly more than thirty feet in circumference and weighs forty tons. On it appear relief outlines of the continents and prominent mountain ranges and peaks. The meridians of longitude, parallels of latitude, zones, foremost rivers, and the names of the oceans are cut into the stone.

The globe was erected as a monument. It was the purpose of the authorities of Swanage to place it so that its inclination would show the angle of the earth's axis as it revolves around the sun, but through a very curious oversight the globe was inclined in exactly the opposite direction. The error was not discovered until the work was completed

Extending in a circle around the globe are stone chairs that indicate precisely the points of the compass at which they are located. On the wall directly behind the monument the various dimensions of the earth are inscribed, also the sun, moon, and several of the largest stars. The philanthropist who gave the monument to Swanage intended it as a help for students of geography.

History is rather uncertain as to when geographical globes were first used, but maps have been in use for many centuries. With the advance of discovery and exploration map-making has become an important industry. The engraving of maps at first was a highly expensive process. It cost as much as a thousand dollars to make a 5 by 8 inch plate, but the development of the printing art now makes it possible to produce such a plate for about seventy-five dollars.



MARBLE GLOBE ERECTED FOR STUDENTS IN GEOGRAPHY. IT WEIGHS FORTY TONS AND IS THIRTY FEET IN CIRCUMFERENCE. THE CONTINENTS OF THE EARTH AND LARGEST MOUNTAIN RANGES ARE SHOWN IN RELIEF, ALSO THE MERIDIANS OF LONGITUDE, THE PARALLELS OF LATITUDE, AND PROMINENT RIVERS

NO BATTLESHIP IS COMPLETE UNTIL ITS FLAG LOCKER, IN CHARGE OF THE SIGNAL QUARTERMASTER, CONTAINS THE STANDARD OF EVERY COUNTRY IN THE WORLD AS WELL AS A SET OF SIGNALS. A COMPLETE OUTFIT COMPRISES 480 FLAGS. THESE ARE MADE AT THE NEW YORK NAVY YARD. FIFTY WOMEN DO THE WORK BY HAND.

WHY EVERY AMERICAN BATTLESHIP CARRIES 480 FLAGS.

A GOOD idea of the number of flags that must be carried aboard every battle ship in the United States navy can be realized by studying the accompanying illustration. This pile is fifteen feet long and almost shoulder high. It represents the flag outfit recently finished for the U. S. S. Wyoming. This outfit is in the charge of the signal quartermaster.

The United States navy employs fifty expert needlewomen in the New York navy yard. They cut out and finish the various flags for battle ships.

Foreign flags are encased in thick paper bags. The name of the country is stenciled on the bottom. All foreign flags are 25 feet long by 13 feet wide. Certain foreign flags are emblazoned with animal shapes, curious designs, and marine landscapes. They are, therefore, difficult to make and require a surprising length of time to finish. The remainder, including the flags for ordinary use, signal sets, the international code, etc., are not wrapped, but tied in round bundles and lettered.

Every war-ship carries 480 different flags. This is the regulation number. The material and making cost the government $2,500 for each ship. This sum, multiplied by the number in the service, foots up to hundreds of thousands.

The flag of the President of the United States requires the longest time to complete. It takes one seamstress a month to finish it. This consists of the life-size eagle with long, outstretched wings and other emblems. It is hand-embroidered and involves much labor.

DID YOU EVER INVENT ANYTHING?

IF you have, the Current Mechanics Department offers you an opportunity to bring your invention before the public. This is a rare chance for the inventor who thinks he cannot find a way to let the world know what he is doing. If you have an invention that seems to be practical, let us see it. Describe it in three hundred words or less and mail it with photograph, blue print, or original sketch. We will pay promptly for whatever we accept. Unless accompanied by stamps, manuscripts or drawings will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

ALTHOUGH THIS PRODUCT OF THE ATLANTIC COAST CRUSTACEAN FARMS IS CAREFULLY TAGGED AND NUMBERED FOR FEAR THAT HE MAY GET LOST, HIS MOTIVE POWER EQUIPMENT WILL CARRY HIM JUST ABOUT TWELVE MILES DURING HIS LIFETIME

WE'VE GOT THIS LOBSTER'S NUMBER!

THERE is this difference between the sea lobster and the land lobster: The sea lobster never travels more than twelve miles from the spot where it was born; the land lobster has no limit.

Railroad men, especially the pink-faced gentlemen of the passenger traffic department, consider the stay-at-home citizens the most unprofitable product of the nation. They strain their buttonholes trying to frame inducements which will draw the man who stays at home to take a trip on one of their trains.

Why don't they just mail around time-tables with lobsters on them and this in red ink: "A Lobster Never Goes More Than Twelve Miles from Home. Are You a Lobster?"

The way they got figures on the habits of the lobster is by putting tags around their necks and turning them loose. The fish commission of Rhode Island thought of it first, and there belongs the credit of knowing how far a lobster wanders.

Of course, the lobsters of a bigger State may travel farther. Those that have been tagged and retaken may have had the Rhode Island conception of distance. To them twelve miles may be a tremendous stretch to cover in one small lifetime.

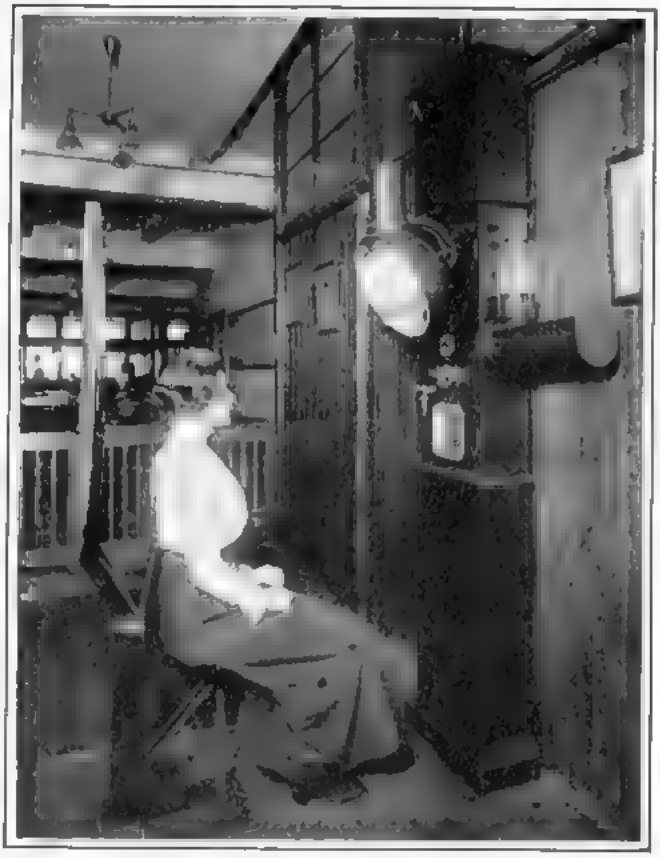
But taking this as a figuring basis for all lobsters, we should be able to gather a good deal of comfort from the knowledge that there is something slower than trains. In future when passengers chafe at delays and speak bitter sarcasm about speed, let the conductor, instead of getting red around the neck, smile and reply:

"But consider the speed of the lobster, my dear sir. The lobster covers but twelve miles in its whole life of continuous travel, while this train, running spasmodically, makes that many miles in a single hour.

"Here you are, chafing your patience raw because this train isn't making more than thirty miles an hour," he says kindly. "Still at that rate, brother, you can cross the continent in five days. Let us consider how much you are ahead of the lobster. Granting the average life of the lobster to be thirty years, let us say that he leaves St. Louis on the day he is born and goes west. He'll just be in sight of the water tank at Eudora, Kansas, when he falls over and dies.

"Speed, brother, speed is the disease of the sore-nerved American people today. When you are going fast you don't know it. That's the trouble with you."

YOUR PHOTOGRAPH TAKEN AND DEVELOPED



SITTING BEFORE THE PHOTO-MACHINE WHICH AUTOMATICALLY TAKES AND FINISHES A PHOTOGRAPH IN SIXTY SECONDS. THE BOTTLE AT THE SIDE OF THE MACHINE CONTAINS THE FLUID WHICH SIMULTANEOUSLY PERFORMS THE FUNCTIONS OF BOTH DEVELOPER AND HYPO, MAKING THE PICTURE POSSIBLE

THE development of the camera has had a wonderful influence on civilization. It has served to illustrate instructive and entertaining books; it has been of material assistance in medical and scientific investigation and discovery; it has had widespread educational effect in connection with the stereopticon, which lends life and interest to lectures, and it has afforded diversion to millions in moving pictures.

The latest development of the camera is the machine shown in the accompanying illustrations. It takes your photograph while you wait. The photo-machine is entirely mechanical — taking, developing, and delivering the finished picture to the subject within one minute. It is operated entirely by electricity.

The picture on this page shows all that it is necessary for the subject to do. You merely sit before the lens of the camera, which is inside the box. Just above the picture is a small mirror, which enables you to assume a pleasing pose. Then you drop a coin in a slot.

Immediately the arc lamp at the top of the machine flashes out brilliantly. You are allowed a few seconds to pose. Then a bell rings. This means that the lens of the camera has opened and the exposure is taking place.

After six or seven seconds the bell rings again, signifying that the exposure is ended. The arc lamp goes out, and for a fraction more than half a minute there is a faint whirring of the works inside. Within a minute after you sat down the finished picture emerges from a slot near the lens. The picture is in the form of a disk, about two inches wide, set in a light gilt frame.

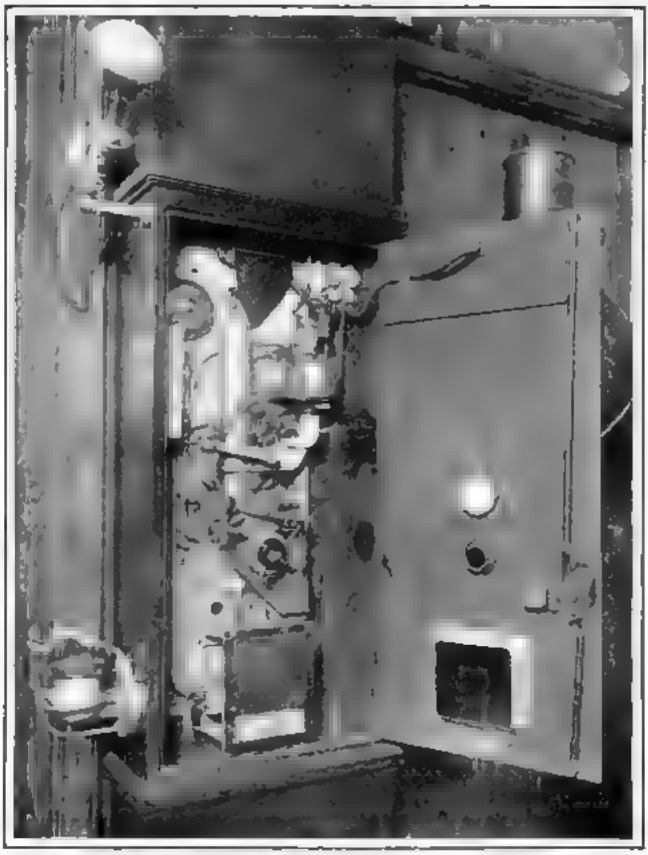
While the construction and operation of the machine is very ingenious, it could not be more than a mechanical possibility without a peculiar developing fluid. This is the secret of the machine's success and also the secret of the inventor. In manual photography the development of a picture requires immersion in proper developer and also in hypo.

This process is followed by protracted washing and the final drying. The fluid in the machine performs the functions of both developer and hypo.

BY AN ELECTRICAL CAMERA IN SIXTY SECONDS.

The operation of the machine is not intricate. After the coin passes through the slot it strikes a rod which starts the actuating motor and throws in the arc lamp. Almost simultaneously the small plate is released and falls into position behind the lens

After a few seconds the lens opens, and when it has closed the plate drops into the developing bath. The illustration on the opposite page shows the developer in a large bottle near the top of the outside of the machine. With each operation a small quantity of the fluid passes downward into a small container, where the picture is developed. It then flows out through a waste-pipe.



THE INSIDE OF THE PHOTO-MACHINE SHOWING THE MECHANICAL CONSTRUCTION BY WHICH PLATES ARE PLACED IN THE CAMERA EXPOSED DROPPED INTO THE DEVELOPER AND DELIVERED TO THE SUBJECT IN SIXTY SECONDS THE ENTIRE MECHANISM IS OPERATED BY A SMALL MOTOR

The photo-machine would have been regarded as a creation of evil spirits a century ago, for the camera as we know it is a distinctly modern creation. It is said that photography was first suggested by a Swedish chemist named Schule, but history gives to Thomas Wedgewood, an Englishman, the honor of being the first photographer. In 1791, by the use of salts of silver, he succeeded in making a number of copies of pictures.

Little or no progress seems to have been made until 1827, when a man named Joseph Nicéphore Niepce, after thirteen years of experimenting, made the first camera image with an exposure of seven or eight hours. This, of course, was hardly a method that could be applied to photographing anything with movement. Twelve years afterward two men—the famous Daguerre and Talbot—appeared almost simultaneously with what is now known as the daguerreotype picture. Daguerre announced his discovery first, and this is probably why his name has always distinguished such photographs.

The first sunlight picture was taken in 1840 by Professor William Draper, an Englishman. It was a photograph of his sister and is still in existence. With his method, however, it was possible to make only one picture at a time. Prints could not be made then from a negative as is the process to-day.

The problem of finding sensitized paper was finally solved by Talbot. He was the first man to make it possible to print any number of pictures on paper from a glass negative.

HOW NATURE HAS COLORED INSECTS TO RESEMBLE

IN all orders of animals — from the lowest to man — nature has peculiarly evolved some species that are especially provided with the means to survive in the struggle for existence. With the artificial weapons that have been the fruit of his gradual mental growth, man can protect himself from his enemies. Among the animals the means of protection are natural phenomena. Insects furnish many striking examples of this.

Nature's coloration, by which insects are enabled to assume what entomologists call "protective resemblance," is very interesting. Two types of protective resemblance are shown in the accompanying photographs and show how nature provides her means of defense

The picture on this page shows a strange insect commonly known as the "walking stick." It is wingless, with an elongated body of a greenish-gray color. It is usually several inches long, and inhabits subtropical regions and the warmer parts of the temperate zones. It feeds on plants, but the species is rarely found in sufficient numbers to do much damage.

It is the prey of birds. How it protects itself from its feathered foes and remains safe can be seen from a close examination of the picture. At the bottom of the photograph is a specimen of the "walking stick." In the upper part of the picture, among the leaves, the resemblance of the "walking stick" to the twigs shows the close similarity—in fact, it is hardly possible to distinguish the insect from the plant. Many instances have been recorded by gardeners while pruning of mistaking a "walking stick" for a superfluous part of the growth

THE "WALKING STICK," AN INSECT SEVERAL INCHES LONG, OWING TO ITS GREENISH-GRAY COLOR IS ENABLED TO RESEMBLE TWIGS AND LEAVES. THE INSECT ITSELF IS SHOWN IN THE LOWER LEFT-HAND CORNER OF THE PHOTOGRAPH IT IS ALSO SHOWN CLINGING TO THE STEM IT SO CLOSELY RESEMBLES.

In the picture on page 475 is another wonderful example of protective resemblance. It is a butterfly found in India. Its similarity to the leaf is astonishing. At the approach of an enemy the "walking stick" crawls among the twigs, where his likeness to them effectually conceals him, and the butterfly takes the position shown in the picture, and resembles a leaf.

In protective resemblance the animal or insect usually seems to be some unpalatable object The "walking stick" seems to be old and withered and the butterfly looks like a dried-up leaf. Large caterpillars have been known to imitate poisonous snakes.

In the obliteration of insect pests natural mim-

PLANTS, SO THEY MAY FOOL THEIR ENEMIES.

THIS INDIAN BUTTERFLY SO CLOSELY RESEMBLES A LEAF THAT IT IS ABSOLUTELY IMPOSSIBLE TO TELL WHICH IS THE PLANT AND WHICH THE INSECT. THE BUTTERFLIES CLINGING TO THE TWIG SHOW HOW CLOSELY THEIR WINGS RESEMBLE LEAVES

icry has often retarded progress, but insecticides, which are preparations for killing insects, render resemblance futile when plants are thoroughly sprayed with deadly fluids or dusted with poisonous powders.

The question of fighting insects was raised hundreds of years ago, but it was not until the eighteenth century that the first insecticide appeared. Paris green was first used in Michigan in 1867. Experiments were then being made all over the world to overcome the marauders that were destroying crops. It was eventually found that one of the best chemicals for fighting bugs was arsenate of lead, as it did not scald or injure the plants.

Farmers were suffering keenly in this country in 1895, and the Department of Agriculture decided to make a most thorough investigation of the problem. Agents all over the country visited farms, made experiments, ascertained the precise extent of the losses, and gathered a mass of facts which were analyzed by the department. It was concluded, after much consideration, that the most effective insecticides were arsenical mixtures, and, strangely, one of the most simple—kerosene emulsion, which is nothing more than kerosene oil mixed with lye.

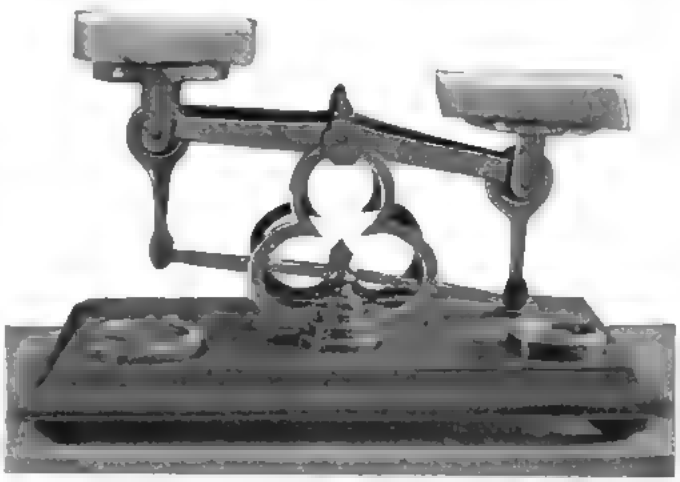
Entomology is a bigger part of this country's work than is generally supposed. The agricultural department has experts in every large community

CURIOSITIES CAUGHT BY THE CAMERA

IF you are a camera fiend here is a chance for you to sell your photographs and make your camera a paying investment. We want odd, unusual, and curious photographs of all sorts, photographs that are interesting because they are out of the ordinary. Submit whatever pictures of this description you take anywhere. Unless accompanied by stamps, photographs will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

SIMPLE METHODS FOR DETECTING IMPURITIES IN FOOD.

DESPITE Dr Wiley's splendid fight for pure food and the cooperation of many municipalities, adulteration and the use of substitutes for genuine ingredients of foodstuffs is still practised at the expense of the consumer. Unscrupulous manufacturers still continue to defy the purpose of the pure-food laws, and in some cases succeed in exploiting their inferior articles and selling them in large numbers. Many of the substitutes are mild poisons, or at least matter which is injurious to the human organism in a greater or smaller measure



TAKE TWO PIECES OF BREAD OF EQUAL WEIGHT PLACE THEM IN THE OVEN FOR AN HOUR THE ONE THAT WEIGHS THE LEAST AFTER BAKING HAS THE MOST NUTRIMENT

The accompanying pictures show several very simple ways of detecting impurities in food. They are interesting experiments, which may be made in any household

The first picture explodes an old theory — that the lightest bread is the best and most easily digested. Take two pieces or loaves of bread of the same size and place them in an oven for an hour. The moisture caused by fermentation is thus drawn off, and the bread which weighs the lightest has the higher food value, because it does not contain too much yeast

In making bread with cheap flour knavish bakers use alum to whiten the bread and give it the appearance of having been made from really good flour To ascertain whether or not there is alum in bread pour some tincture of logwood on a slice, and if the alum is present the bread will turn blue

When poured on pure bread the tincture will work no material changes

The difference between real butter and adulterated butter or oleomargarin can be determined in a few moments. Place a small piece in a tea or tablespoon and hold it over a spirit stove or a small gas flame Your ears do the rest. Pure butter boils quietly, while adulterated butter or oleomargarin sizzles and splutters noisily

TO TEST BUTTER, TAKE A TEASPOONFUL OVER A SPIRIT STOVE OR GAS FLAME PURE BUTTER BOILS QUIETLY ADULTERATED BUTTER OR OLEOMARGARIN BOILS AND SPLUTTERS VIOLENTLY

In the manufac-

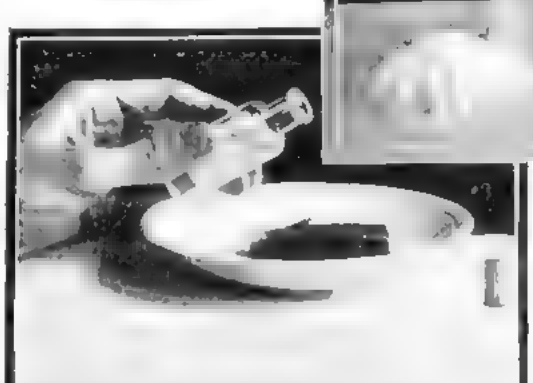
ture of many jams sold as pure little or no real fruit is used, and dyes are often employed to give the jam the proper color red for strawberry, for instance, purple for grape, and so on. The presence of these dyes can be easily detected. Place a small quantity of the jam in a little water and make a thin solution. Dip a piece of clean cotton wool into it. If the jam is pure the color can quickly be washed from the cloth, but if dye has been used the cleansing of the cloth will be quite difficult.

Tea and sugar can also be very simply tested. As shown in the picture at the top of this page, to test tea it is only necessary to place a small quantity in the folds of a handkerchief and let it remain there for a few minutes. If the tea has been dyed to make it resemble a superior brand it will leave brown stains on the cloth. If it is the genuine article the handkerchief will still be clean.

A great deal of foreign matter is sometimes used by dishonest refiners and grocers to adulterate sugar and add weight to it. Sand and bonedust are favorite substitutes. Take a small quantity of sugar and boil it. If it is pure it will dissolve completely into a clear, transparent solution. Any impurities in it will cause it to become cloudy. Among the most adulterated products are candy and "fancy" shelled nuts. To make these viands tempting, as well as preserve them, they are "weather-proofed" with bleached shellac. Nearly all of the ice-cream served at five-cent soda fountains is made of lard. Some New York dealers were charged with using soap-suds to give the appearance of foam.

PLACE DRY TEA LEAVES BETWEEN THE FOLDS OF A CLEAN HANDKERCHIEF. IF THE LINEN STAINS BROWN THE TEA IS DYED.

IF THE JAM IS DYED THE STAIN WILL NOT WASH OUT OF THE COTTON



IF THERE IS ALUM IN BREAD TINCTURE OF LOGWOOD WILL TURN THE BREAD BLUE.

PURE SUGAR SHOULD DISSOLVE COMPLETELY AND MAKE A CLEAR SOLUTION THROUGH WHICH ORDINARY NEWSPAPER PRINT MAY BE READ EASILY

TELEPHONING WITHOUT WIRES MAY BE PERFECTED BEFORE LONG. ELMAN B. MYERS, OF NEW YORK APPEARS TO HAVE MADE IT POSSIBLE TO TALK ALONG THE ETHER. MR. MYERS IS SHOWN AT THE TRANSMITTER OF HIS WIRELESS PHONE IF THE READER COULD REMOVE THE SHEET BACK OF THE TRANSMITTER HE WOULD SEE THE MECHANISM THAT MAY MAKE WIRELESS TELEPHONING POSSIBLE IT IS HIDDEN BECAUSE THE PATENTS ARE PENDING

INVENTOR STARTLES WARSHIP BY WIRELESS TELEPHONE.

SOMETHING over a year ago, when the battleship fleet, massed in the Hudson River, New York, was proving to an interested populace that we own a real navy, the wireless operators were astonished one evening to hear gentle music floating through their headphones. Very distinctly, lacking something of the usual metallic ring, "Salve, dimora," sung by Caruso into the phonograph, was magically replacing the snappy dot of commercial wireless telegraphy, and Sousa's band, crashing soundlessly along ether waves from somewhere, was eliminating the whining buzz of the dash.

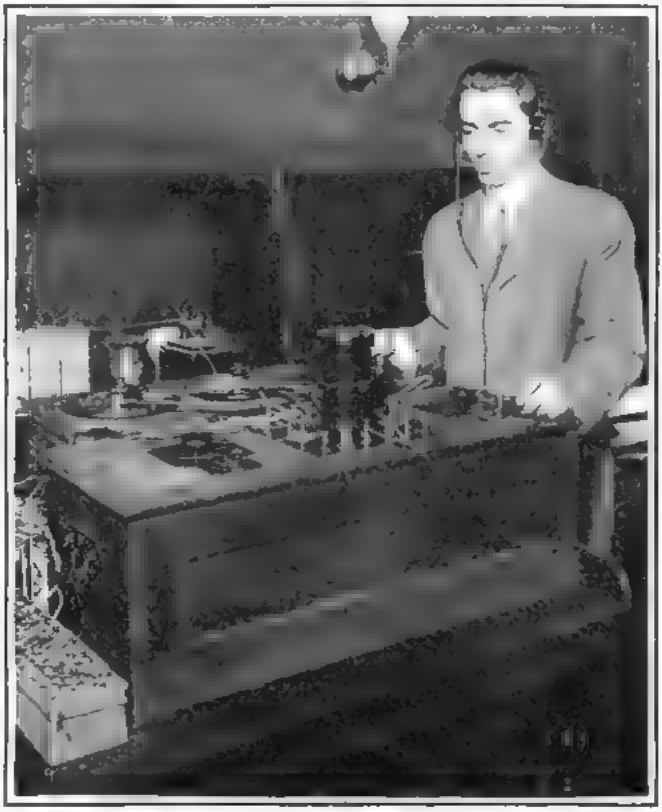
It was an experience quite remarkable for any one who happened to be working with a properly tuned wireless apparatus that evening. The papers mentioned it next day, their news being largely confined to the fact that a young amateur living in the Harlem district of New York City, had been serenading the battleships with canned melody delivered through a wireless telephone of his own invention

The inventor's name is Elman B Myers. He is twenty four years old However dumfounding his performance might have been half a dozen years before, it lacked absolute novelty. Wireless telephony, over short distances and under ideal conditions, had already been accomplished.

In Albany, New York, a wireless telegraph company had given up the attempt at successful communication with New York City. This Albany-New York stretch is notorious as one of the worst patches of road that ever wireless wave was called upon to travel. Countless hills along the route, filled with low-grade iron ore, absorb oscillations of the ordinary kind much as a sponge absorbs water, and hardy indeed is the fragment of intelligence that reaches the end of this particular journey by wireless

Some six months ago the Harlem

amateur who had amused the battleship operators took over the old plant and began the installation of a wireless telephone apparatus of his own designing The huge steel tower, four hundred feet high, and the four and one-half miles of aerial wires he used as they stood. The rest of the outfit was original, and it is a matter of record that when at last things had been properly rigged to the inventor's satisfaction, the juice was turned on and after less than half an hour of adjustment the human voice was floating straight from Albany to New York on no more substantial medium than electro-magnetic waves in the ether. The Elman Myers wireless telephone as a practical means of communication had become an established fact



ELMAN B. MYERS LISTENING TO A MUSICAL PHONOGRAPH RECORD THAT IS BEING SENT OVER HIS WIRELESS TELEPHONE

To this performance two main factors had contributed. One of them was the unusual note in Myers's make-up which causes him to regard the almost universally well-liked "line of least resistance" with something like contempt and sets him to doing the hardest thing first Broadly, the radio-telegraph apparatus had been regarded as infinitely more powerful and efficient for long distances than anything the wireless telephone could produce under any conditions. Hence the Harlem inventor felt it incumbent upon himself to step into the worst possible telegraph zone and make himself heard

The other factor was an electro-magnetic wave of his own creation, involving what is claimed to be practically a new electrical principle

Wireless waves of the usual kind are set up by what amounts to a darting back and forth of a high-tension electrical discharge. The backward and forward trips might well be considered rather frequent since they number some hundreds of thousands per second. In this particular wireless phone low speeds are ignored, the voice, spoken into an apparatus not unlike the ordinary transmitter, using also an electric arc of the inventor's own devising, reaches the transformer—in circuit, of course, with a generator—and an unusual thing takes place.

Entering as a sound wave, the voice emerges to the ground and aerial connections as a sustained magnetic wave of no less than 2,500,000 cycles per second.

Several odd things seem possible to this rapid-fire agitation of the impalpable ether. Radio-telegraph waves of the spark systems have a decided partiality to the hours of darkness for their best

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Munsey's Magazine

Again Blazing a New Path

BEGINNING with the June number, MUNSEY'S MAGAZINE, the flag-ship of the Munsey Publishing House, initiated the publication of a complete book-length novel in each issue.

This is an epoch in the making of standard magazines—something distinctly new. It marks the beginning of the end of serial publication in monthly instalments. It means that when the serials now running in MUNSEY'S MAGAZINE are finished, all fiction and all everything will be complete in each number.

The complete novels in MUNSEY'S MAGAZINE will not be mere novelettes, but full-length book stories—stories that would run through six to a dozen numbers if printed in serial form, stories that will sell for $1.25 to $1.50 as books.

This new departure is not altogether an experiment, as we inaugurated the publishing of book-length novels in THE ARGOSY and THE ALL-STORY about a year ago. It is new, however, strictly new, as applied to standard illustrated magazines.

MUNSEY'S MAGAZINE has never been a slave to conventionality. It has never been a trailer. It has blazed many new paths, has done many new things. But at no time has it done a more revolutionary thing than that which it initiated with the June issue, in the publication in full of a long book novel.

The weekly publication is preeminently the medium for serial stories. In it the time between instalments is just about right—not too long, not too short. In the monthly issue, the complete book novel is the logical thing. Serial publication in the monthly, notwithstanding the vogue it has had, is illogical and unsatisfactory. I don't believe the average reader to-day is satisfied to wait an entire month for an instalment of a serial story and then wait another month and another and another, covering, in all, six or eight or a dozen months.

This new move means that MUNSEY'S MAGAZINE will give the reader, during the next twelve months, from fifteen to eighteen dollars' worth of books—one dozen $1.25 to $1.50 books. And all this in addition to the usual contents of the magazine—articles, illustrated and plain, editorials, poems, short stories, and departments. The only change will be the substitution of the complete book novel for the serial story.

New York, June 2, 1913. **FRANK A. MUNSEY.**

"The Flying Courtship," by E. J. Rath, the complete novel in the June MUNSEY, has made a great hit. It is a live-wire story from start to finish a story that in book form will be "a best seller."

"The Kangaroo," by Harris Dickson, which will appear in the July number, is a very strong novel. Its scene is laid on the lower Mississippi, in the year 1835, when adventurous spirits were thronging into the new Southwest. The story progresses through a series of exciting incidents to a climax of rare intensity.

"The Little Nugget," by Pelham G. Wodehouse, will be the complete novel in the August MUNSEY. It deals with present-day life, and combines a strong plot with a delightful flavor of humor. The scene is laid in England, but several of the leading characters are Americans.

If you have not had the June MUNSEY, order a copy from your newsdealer. If he has sold out his supply, he can get it for you, or you can get it direct from this office at 15 cents, the regular price of the magazine. You would do well to start with the first novel of this remarkable series—"The Flying Courtship"- in the June MUNSEY.

working. The reason does not appear to have been settled definitely. For his own brand of dirigible lightning, Mr. Myers states that he prefers tests made at high noon, with plenty of sun—not that his apparatus does not work as well at night, but noon is more convincing.

He says, too, that on several trials it has operated quite as efficiently as otherwise through thunder-storms that would send the average wireless man hunting for his life-insurance policy.

Sharp Tuning Is Vital to Success.

It is, in short, a magnetic wave radically different from those created by the original wireless sparks and not susceptible to the influences which interfere most frequently with them, yet at the receiving end of the lineless telephone the general plan of the apparatus is in many respects similar to the usual wireless set, big or little.

The detector used is of the audion type—the most sensitive yet known to wireless practise. Variable condensers of the familiar rotary-plate type are on hand, too. It is in the tuning devices and the "resonator," nicely concealed in an oak case perhaps two inches thick, that the secret of efficiency lies. On one point of a given switch the listener is able to pick up all the radio messages within range; passing to the next point, for all evidence of it in the silent telephones, wireless telegraphy might never have been invented

Sharp tuning of this kind—the nice adjustment of receiving apparatus to the sending station—is, of course, vital to the success of any wireless telephone operating in an ether filled night and day by the oscillations of hundreds of telegraph stations, amateur and professional. In the apparatus now under construction for commercial work the inventor proposes to gear his sets so that the telegraph stations are permanently eliminated.

The practical application of this same close tuning is readily seen. Two stations talking at the same time and using a wave of the same length would reproduce the original Babel on a small scale. Given, however, the ability which Mr. Myers claims, to tune within five or six meters of any desired length, given also the production of waves ranging anywhere from a hundred to six or seven thousand meters in length, and the number of stations capable of operating simultaneously without etheric collision is somewhat extended.

The possibilities unfolding before such a proposition are manifold. One of them is the really private long-distance line, giving telephonic communication independent of any intermediate human ear or intelligence. The set in your New York office is tuned mathematically into resonance with the set in your Philadelphia branch. You pick up your transmitter, talk, listen, and hang up again.

You have not waited for an open wire and, barring the remote possibility of some one having discovered your exact wave length and constructed an apparatus capable of receiving it, nobody, save the fellow at the other end, knows what you have been talking about.

Again, the sea. Over land Myers has a duly authenticated record of 700 miles with rather crude apparatus. Unofficially, wireless operators have reported hearing his conversation at a distance of 1,200 miles. Now it has been pretty well established that electro-magnetic waves of this character travel at least twice as far over water as over land, yet this inventor has not cared to make extended over-water tests with his present 10 horse-power apparatus.

May Talk Across Ocean.

He is waiting for the completion of a coming 150 horse-power station—which, by the way, will be the largest wireless plant in the world—and with it in working order expects to settle down for a heart-to-heart talk with Paris.

Nevertheless, see where this may lead within a very few years. You ransack the office for the precious option, expiring to-morrow — the option which means millions or ruin for the firm. You fail to find it. Having torn out three handfuls of hair you think of your partner, who sailed day before yesterday for Europe. Snatching up the conventional telephone with trembling hand, you demand the wireless phone, and through it the steamer, and, lo, he has it in his pocket!

HOW TO MAKE THE SHEET BEND KNOT ACCURATELY.

MANY of us have been annoyed by having a knot pull apart or slip, and have been at loss to know why it should do so, while at times, when we have thought that we tied one in exactly the same way, it held securely. In many cases, when a knot held, it was a square knot, and the one which slipped was a "granny." These two knots are so nearly alike that one must look somewhat closely to detect the difference, yet the granny is practically useless, while the square knot is perfectly secure. The difference all lies in the manner of crossing the ends of the cord the second time. The effort required for one is no greater than for the other; but the motion required for either quickly becomes a habit which, if continued, is very hard to break off

In the square knot (Figure 1) the ends are so crossed that the two parts of each cord pass side by side and come out together through the loop, or bight, formed by the other. In the granny knot, shown loosely tied (Figure 2), the two parts of each end come out on opposite sides of the loop of the other. The latter knot will *sometimes* hold securely after it is pulled up tight, but it is very insecure and unsafe. It is well worth while to get the square-knot habit

Though there is no rope fastening more secure and permanent than the square knot, it is open to the objection that, when it is pulled up tight, it is apt to be somewhat difficult to undo. For this reason it is often better, after one has confirmed the square-knot habit, to use the sheet bend in cases where one is likely to want to untie it.

To make this hitch (Figure 3) one first turns one of the ends into a loop which he holds with the left hand. He then passes the other end upward through this loop, carries it outward and downward, across underneath and up on the inner side, then outwardly across on top of the loop and under the other part of itself.

When this knot is drawn tight it will hold as securely as will a square knot; but will always be capable of being easily untied, no matter what strain it may have been subjected to or however wet

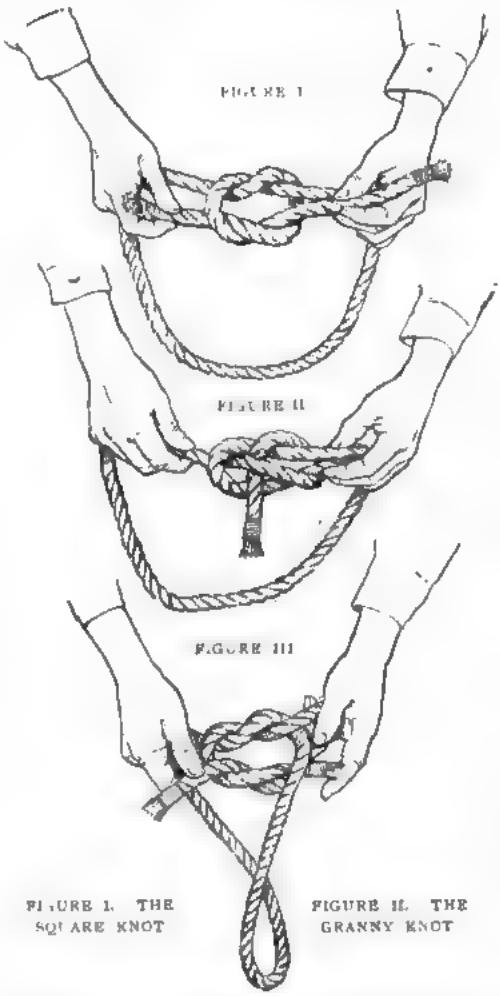


FIGURE I. THE SQUARE KNOT

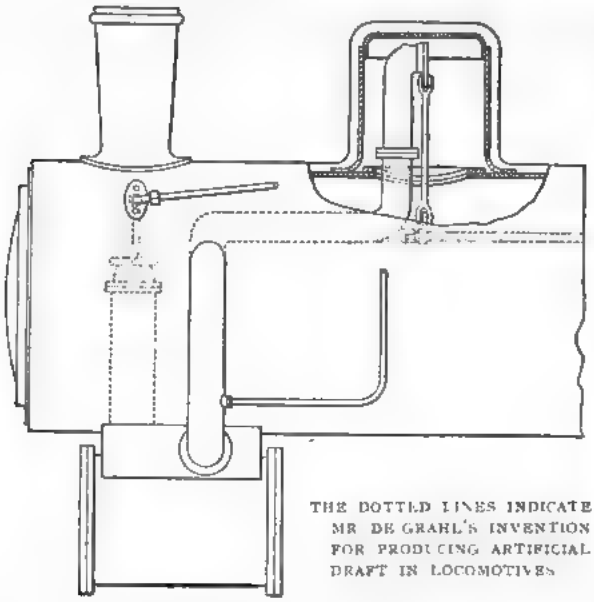
FIGURE II. THE GRANNY KNOT

FIGURE III THE PARTICULAR HITCH THAT MAKES THE SHEET BEND PERFECT

it may be. Sailors are the most proficient knot-makers in the world. They have between thirty and forty different kinds of knots, some of which are especially intricate

DRAFT CONTROLLER.

PROPER draft appliances are an important factor in a locomotive's steaming qualities. A new method of producing an artificial blast in the smokebox of an engine has just been invented by Gustav de Grahl, Zehlendorf, Germany. It is shown in the picture at the



THE DOTTED LINES INDICATE MR. DE GRAHL'S INVENTION FOR PRODUCING ARTIFICIAL DRAFT IN LOCOMOTIVES

top of this page. It also includes a regulating piston actuated by live-steam, by means of which the admission of steam to the auxiliary blast is shut off; by shutting off the steam from the engine the main draft is interrupted and by actuating the regulating piston in opposite direction the admission of steam to the auxiliary blast is obtained again.

The new feature of the invention consists in providing two valves which are preferably manually operatable; one of the valves controls the admission of steam to the auxiliary blast as well as to the steam-nozzles of the furnace, and it may be opened automatically by the regulating piston when the steam is admitted to the engine. This valve may be closed manually if the steam is shut off from the engine. The other valve can be opened manually in order to admit steam to the auxiliary blast if the steam is shut off from the engine, and by closing the first-named valve the steam to the auxiliary blast is also obstructed.

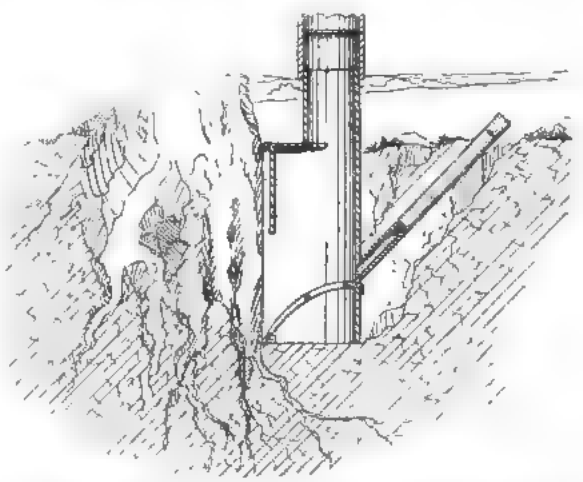
TO REMOVE STUMPS.

FARMERS sometimes have considerable trouble in ridding their fields of stumps which take up valuable space. Many means are employed to remove them. The latest method is the invention of Walter Clifford, Paxton, Florida. It is shown in the picture at the bottom of this page. It consists merely of an iron cylinder with an arched grate at the bottom and two draft-pipes fitted with ordinary dampers.

To remove the stump a small hole must be built at one side of it and the stump burner—filled with the necessary fuel, which is set on fire—is placed in this hole. The pipe extended at an angle from the burner supplies the necessary draft to keep the fire burning and also to direct the flames over toward the wood. This draft-pipe is fitted at the upper end with a damper, which can be opened or closed. The inventor claims that the fire will eat its way through the stump and sever it from its roots and it can then be easily removed

TONGS USED AS SHOE-TREE.

WHEN it is necessary to stretch shoes a shoe-tree is not always handy. A woman inventor worked up a rather simple and ingenious way of stretching the uppers of shoes by the use of a pair



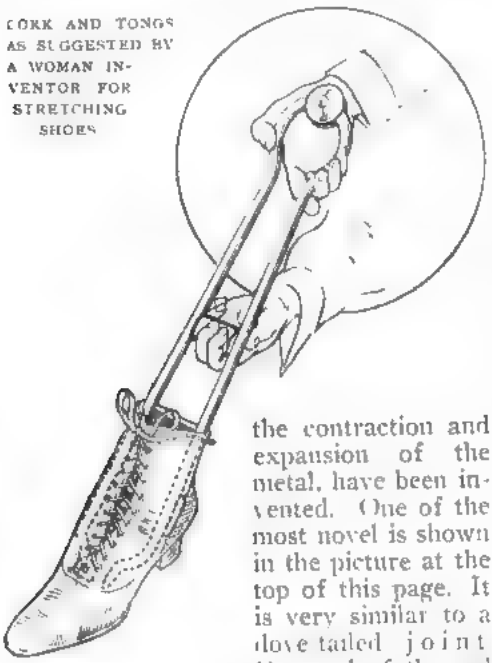
INVENTOR CLAIMS THAT STUMPS CAN BE REMOVED MORE EFFECTIVELY BY FIRE THAN BY DYNAMITE

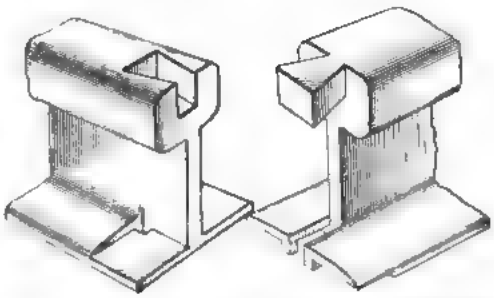
of fire-tongs. As shown in the accompanying picture, an ordinary cork was placed between the prongs of the tongs and the tongs were then inserted in the shoe. By simply moving the cork upward upon the prongs they were forced outward and the upper was stretched in this way. The pressure could be increased or lessened by moving the cork up or down.

BOLTLESS RAIL-JOINT.

MANY types of rail-joints intended to eliminate the use of bolts and plates, and at the same time to permit the contraction and expansion of the metal, have been invented. One of the most novel is shown in the picture at the top of this page. It is very similar to a dove tailed joint. One end of the rail is made with a V-shaped incision. The other is fitted with a V-shaped projection, and a small portion of the base of the rail is cut away as shown in the right-hand drawing. The V-shaped projection is inserted in the V-shaped incision, while the base of the rail shown in the left-hand drawing receives the base of the other. None of these joints has been put into actual service.

CORK AND TONGS AS SUGGESTED BY A WOMAN INVENTOR FOR STRETCHING SHOES





DOVE TAILED RAIL-JOINT TO PRODUCE STEADINESS AND ELIMINATE FISH PLATES

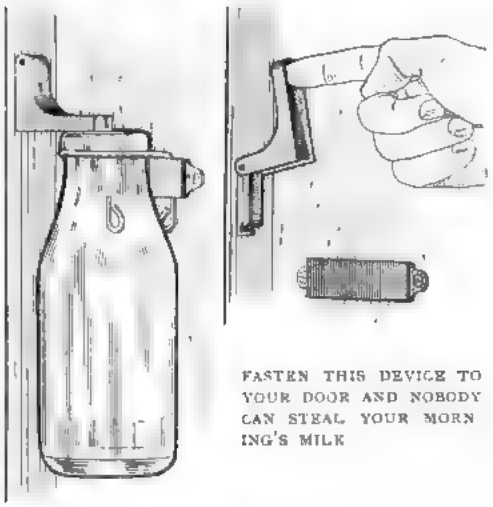
HOLDS CLOTH ON BROOM.

TO prevent dust from rising when a room is being swept, housewives very often tie a small piece of damp cloth around the base of the broom. Amanda McDonald, Central City, South Dakota, has invented a simple means of holding this cloth on and making the attachment but the work of a moment. It consists merely of a small flat metal disk to which are attached four arms. To attach the cloth it is only necessary to pass the disk over the handle of the broom, push it down to the straw, and the cloth can be hooked to the arms as shown in the accompanying picture.

CAN'T STEAL YOUR MILK.

HUNDREDS of bottles of milk are stolen every morning by homeless, hungry vagrants. As a consequence the milk-supply companies suffer considerable loss and receive many complaints from disappointed patrons. A very simple means of making it impossible to steal your milk without breaking the bottle has just been placed in use. It is shown in the two drawings at the top of page 484. It consists of a small steel bar which is screwed securely to the casing of the door. Directly above it is a lock fitted with a small bar, which moves up and down on a pivot. When the bar is lowered as shown in the left-hand drawing it locks automatically and cannot be opened without a key.

COVER FOR BROOM SO A ROOM MAY BE SWEPT WITHOUT RAISING THE DUST



FASTEN THIS DEVICE TO YOUR DOOR AND NOBODY CAN STEAL YOUR MORNING'S MILK

To place the milk-bottle in the device all that it is necessary to do is to pass around the neck of the bottle a tough steel band with hooked ends. The hooked ends pass behind the small bar on the casing of the door and hold up the bottle. The locking bar is then lowered over the top of the bottle as shown in the left-hand picture and, locking automatically, renders it impossible to remove the bottle. The bar prevents the bottle from being raised and the steel band about its neck prevents it from being lowered. On arising in the morning the maid can immediately remove the bottle by unlocking the device with a small key

STOPS WHEELS FROM SLIDING.

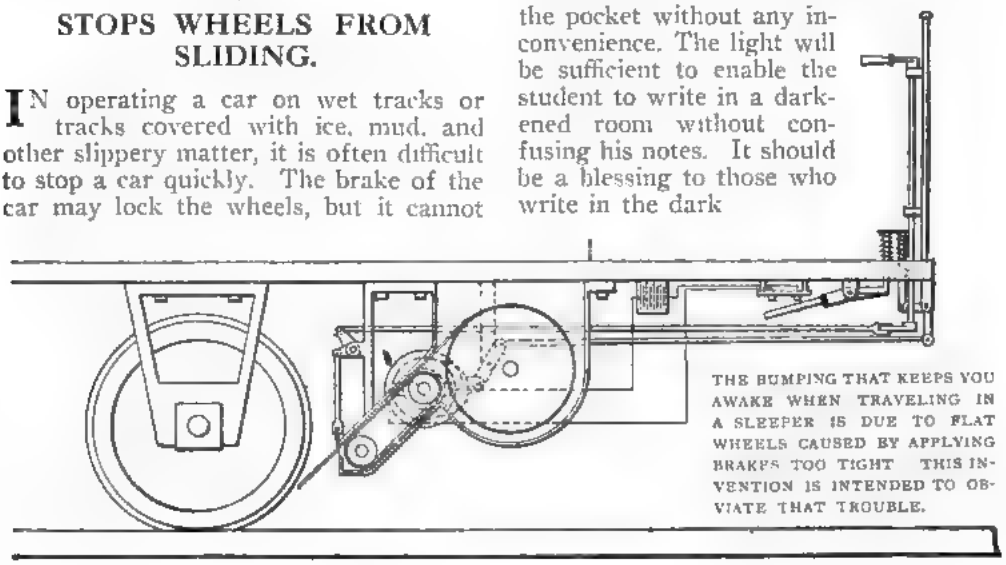
IN operating a car on wet tracks or tracks covered with ice, mud, and other slippery matter, it is often difficult to stop a car quickly. The brake of the car may lock the wheels, but it cannot prevent them from sliding on the tracks' slippery surface. The mechanism shown in the drawing at the bottom of this page will eliminate this, so its inventor, John A. Gruber, Cincinnati, claims.

It consists of a roll of tape that unwinds through the action of a small motor, which turns a small driving shaft attached to the upper end of the roll, as shown in the picture. When the handle on the platform is turned the electric current is thrown in and the driving shaft, impelled by the motor, unwinds some of the tape, which, the inventor says, falls under the wheel and offers sufficient resistance to the slippery surface to bring the car to a stop quickly.

PENCIL WITH ELECTRIC LIGHT.

STUDENTS sometimes find it necessary to take notes at lectures. When a stereopticon is used to illustrate the lecture it is, of course, necessary to show the pictures in a darkened room. This renders it somewhat difficult for the student to make his notes.

A very ingenious invention to obviate this difficulty is shown in the picture at the top of page 485. It consists simply of a small device fitted with a one-candle-power electric bulb. The device is attached to the end of the pencil, as shown in the picture, and a small battery with enough power to illuminate the bulb can be carried in the pocket without any inconvenience. The light will be sufficient to enable the student to write in a darkened room without confusing his notes. It should be a blessing to those who write in the dark

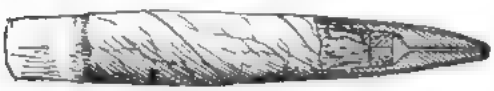


THE BUMPING THAT KEEPS YOU AWAKE WHEN TRAVELING IN A SLEEPER IS DUE TO FLAT WHEELS CAUSED BY APPLYING BRAKES TOO TIGHT THIS INVENTION IS INTENDED TO OBVIATE THAT TROUBLE.

PENCIL EQUIPPED WITH ELECTRIC LIGHT TO ENABLE STUDENTS TO TAKE NOTES AT LECTURES WHERE A STEREOPTICON IS USED AND THE ROOM IS IN DARKNESS.

CONCEALED CIGAR-HOLDER.

A NOVEL concealed cigar-holder has just been invented by John Smith, Moberly, Missouri, and is shown in the

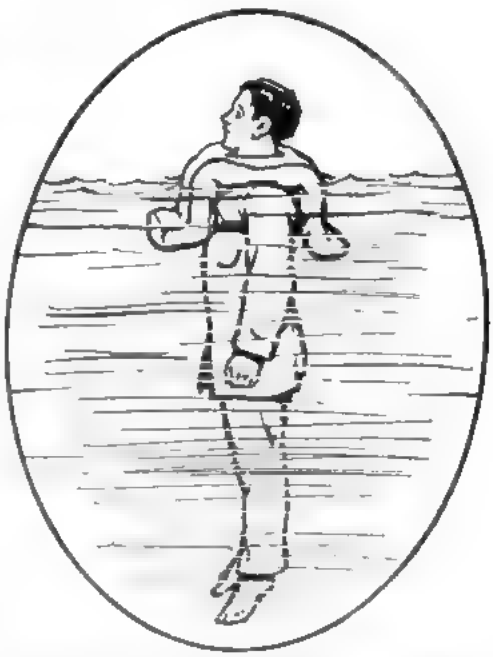


CONCEALED CIGAR-HOLDER PLACED IN THE END OF A CIGAR WHEN THE WRAPPER IS ROLLED ON IT PREVENTS THE SMOKER FROM CHEWING THE CIGAR AND ABSORBS THE NICOTINE

drawing on this page. It consists of a small holder of the ordinary type, but when the cigar is rolled this holder is inserted in one end and the wrapper is pasted around it when the cigar is finished, as shown in the picture. The inventor suggests that the hollow part of the small holder be filled with some suitable material to absorb the nicotine.

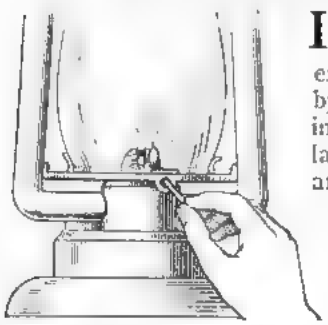
PILLOW LIFE-PRESERVER.

EVER since the sinking of the Titanic inventors have been working on new life-boats and life-preservers in case of serious accidents. One of the most novel of the new life-preservers has just been invented by Samuel P. Edmonds. It consists simply of an inflated rubber pillow with a hole in the center and fitted with straps on each side. To put on the life-preserver thrust the head through the hole and pass the arms over the straps.

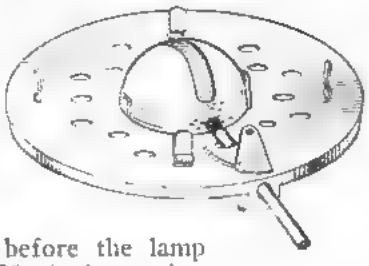


LIFE PRESERVER WHICH HOLDS AND RESTS THE HEAD EVEN IF THE PERSON IS UNCONSCIOUS. IT CAN BE PUT ON IN A MOMENT BY MERELY THRUSTING THE HEAD THROUGH THE HOLE IN THE CENTER OF THE PILLOW AND PASSING THE ARMS OVER THE STRAPS ON EACH SIDE.

NO BREEZE CAN BLOW IT OUT



LAMP EQUIPPED WITH A CORRUGATED BURNER SO THAT A MATCH CAN BE STRUCK INSIDE THE CHIMNEY WITHOUT RAISING IT THIS PREVENTS MATCHES FROM BEING BLOWN OUT BY THE WIND.



IN windy weather much difficulty is experienced, especially by railroad men working in yards, in lighting lanterns. Many matches are often blown out and valuable time wasted before the lamp can be lit. Anthony H. Andersen has invented a very efficient means of overcoming this trouble. His invention is shown in two pictures at the top of this page.

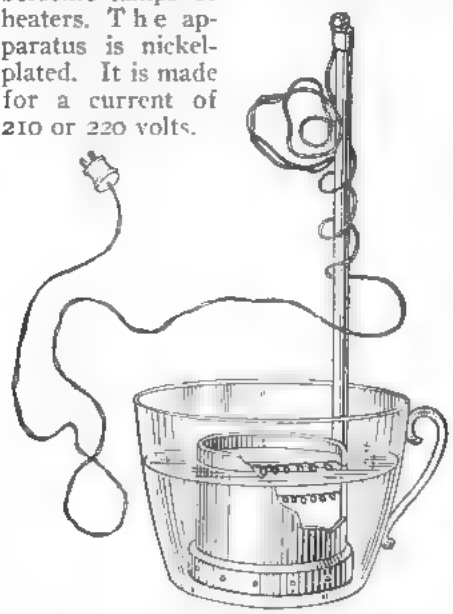
The right-hand picture shows the means by which the match is struck. The burner of the lamp is made with two small holes through which the match can be passed in from the outside without lifting the chimney. As shown in the drawing, one side of the burner is made with a corrugated surface to engage the head of the match. As the match is forced in through the holes and passes over this corrugated surface it is struck, as shown in the right-hand drawing, and immediately lights the wick. It is a very simple but effective device

BOILING BY ELECTRICITY.

THE electric boiler shown in the drawing on this page was designed to instantly heat water without fire It

THIS WIRE SPOON HOLDER HOLDS THE SPOON AT THE EDGE OF A POT AND CANNOT SLIP IN

is a small metal cylinder in which are filaments which become self-heating electricity. These filaments are much like those of ordinary electric light bulbs. You simply place the cylinder in the cup or the glass containing the liquid to be heated, then regulate the current, and in five minutes the water is boiling. There is no danger of fire or a disagreeable odor. Now that one finds electricity almost everywhere he may be sure always of having hot water at his disposal without carrying alcohol or cumbersome lamps or heaters. The apparatus is nickel-plated. It is made for a current of 210 or 220 volts.



BOILING WATER WITH ORDINARY ELECTRIC FILAMENTS. WHEN THE CYLINDER CONTAINING THE FILAMENTS IS PLACED IN A BOWL OR GLASS OF WATER, THE WATER CAN BE HEATED IN A FEW MINUTES

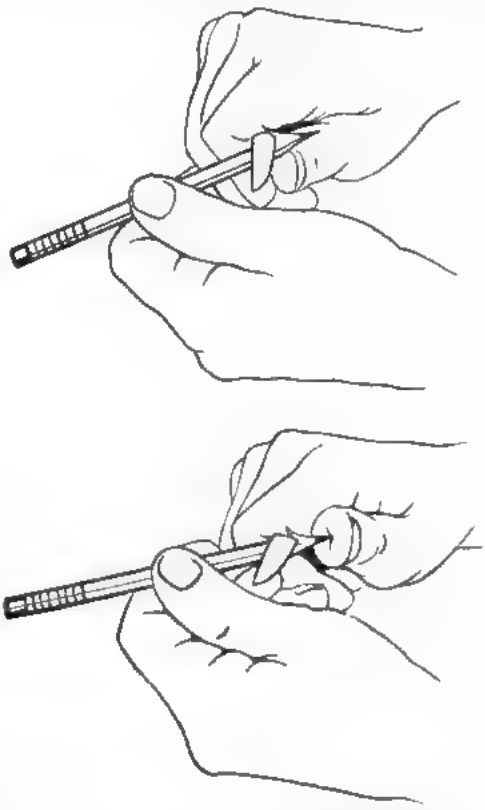
TO SHARPEN A PENCIL WITHOUT BREAKING THE POINT.

ONE is apt to be shocked by the apparently careless manner in which craftsmen handle edge tools, but as a rule this "carelessness" is only apparent because the motions which tend to safety have become so nearly reflex as to escape the notice of the observer The ease of the operator, seemingly careless, is really the result of extreme care, and while the attainment of this ease is not a matter to be despised if one expects to use edge tools, any attempt at its acquisition, except by way of the sleight of hand which renders it unconscious, is sure to fail.

Let the Blade Pass Clear.

Even in so small a matter as whittling a point on a lead pencil there is room for the practise of some mechanical skill; which skill, by the way, is not inborn, but a matter of observation and practise. This, as are many other small jobs of jack-knife work, is best done by steadying the point to be whittled against the thumb; but on a slight difference in the manner of so doing depends a vast difference in the results. One who is skilled will rest the point against the *side* of the thumb (Figure 1) in such manner that the knife blade may pass clear beyond it without touching the skin. Thus he not only avoids unsightly cuts and scratches, but the lead in the pencil is supported against the pressure of the blade and may be whittled to the finest point without breaking.

Another, attempting the same job in what he thinks is the same way, holds the point directly against the front of the thumb (Figure 2). Though the dulness of his knife may save him from severe cuts, it leaves a series of plumbago filled scratches on his thumb, and is unable, even at that, to whittle the lead to a point.



THE RIGHT AND WRONG WAY TO SHARPEN A PENCIL. THE UPPER PICTURE SHOWS THE RIGHT WAY: PLACING THE POINT AGAINST THE SIDE OF THE THUMB. THE LOWER PICTURE IS THE WRONG WAY: PLACING THE POINT AGAINST THE TOP OF THE THUMB

DID YOU EVER INVENT ANYTHING?

IF you have, the Current Mechanics Department offers you an opportunity to bring your invention before the public. This is a rare chance for the inventor who thinks he cannot find a way to let the world know what he is doing. If you have an invention that seems to be practical, let us see it. Describe it in three hundred words or less and mail it with photograph, blue print, or original sketch. We will pay promptly for whatever we accept. Unless accompanied by stamps, manuscripts or drawings will not be returned. Address, Current Mechanics Department, The Frank A. Munsey Company, 175 Fifth Avenue, New York.

In the Eyes of the Law.

BY TEX HOUSTON.

The Facts in the Case of William Carew Are Revealed by a Little Flier Off Duty.

A NOVELETTE COMPLETE IN THIS ISSUE.

CHAPTER I.

Over the Precipice.

HOBART reached the edge of the precipice just as the sun rose. He paused to take in the glorious and to him quite unusual spectacle, and smiled in good-humored ridicule for being abroad so early.

"It isn't as if I'd stayed up all night for it," he mused. "That could be understood, but to get out of bed for it—that's funny! It's worth it, anyhow," he added, as he took a comprehensive view of the green and mist shrouded valley two thousand or more feet below him.

It was a sheer descent from where he stood for what seemed quite half way to the bottom. He looked down, bending slightly over the edge, and saw between him and the forest line the slanting gray space made up of fragments that had dropped from the face of the cliff at one time and another during the past million years or so.

"What a spot to come to on a pitch-dark night!" he thought, drawing back with an involuntary shudder. "Almost seems as if the hotel people should put a guard-rail here."

He looked again, roughly calculating the distance to the slanting bed of broken rock, and speculating curiously whether if a man fell or jumped off he would hit against any projecting nub of the mountainside before he came to rest.

From this precise spot it seemed the fall would be unimpeded, but from a point a few paces to his right there was certainty that a body would strike a shelf that jutted from the cliff to a width of six or seven feet.

It was no more than twenty feet from the top. If fortune favored the falling man, it was possible that he might stop on the shelf without rolling off, and stay there, with nothing worse than some broken bones to pay for his adventure.

Furthermore, it was not exactly straight down from the edge to the shelf. It was the one spot he could see for several hundred yards along the face of the precipice where the descent was not as direct as a plumb line, but at that the difference was not great. A line held at arm's length from the edge would surely bring the plummet to rest on the shelf.

As he studied the scene and its possibilities for tragedy, he observed a bright red flower growing on the outer rim of the shelf. There were other growing things here and there on the steep above it—gray lichen and green moss, and, about a man's height from the shelf, a hardy bush that found rooting in a crevice, but the flower supplied the only spot of bright color.

Hobart wondered what it might be called. It looked like a rose, but he had a vague idea that roses did not bloom in September, even on a mountain top. Whatever its name, he was seized with a sudden, romantic desire to possess it.

There was a girl he knew at home who would prize that blossom if he should send it to her in a letter. The only question was, could he get it?

Hobart went along the cliff and stopped directly over the shelf. It certainly seemed possible. The face of the cliff here was ragged. There were no end of nubs for hand and foothold down as far as the hardy bush, and that was evidently strong enough to bear his weight if he should let himself hang from it till his feet touched the shelf. By the same token, if it held then it would hold again when he had plucked the flower and was ready to climb back.

This project was more foolhardy than romantic, but Hobart was young. The possibility of dizziness occurred to him only to be dismissed with contempt. He knelt upon the edge, back to the empty air over the valley, and cautiously rested his foot on the first projection within reach.

Slowly, for he prided himself on his coolness and deliberation, he thrust his other foot down and tried his weight on the next nub before trusting wholly to it.

His hands now grasped the edge itself. He looked down between his body and the cliff for the next resting place. He found it, and gently lowered himself.

So, by short stages, he came at length to the bush. Touching the nub at his face level merely to assure his balance, he stood on the base of the bush until he was satisfied of its strength.

Then he knelt upon it, grasped it with both hands, and let himself down until his toes barely touched the shelf—his goal. Hanging thus an immeasurable instant, he saw that the cliff retreated there, forming a shallow cave.

In the same glance he saw a man leap from the gloom within, intent on pushing him over the precipice.

Hobart saw the man just in time to strengthen his grip on the bush from which he hung. Half a second later, and the tension of his muscles would have been relaxed, his hands would have let go their hold, and he would inevitably have demonstrated his speculations of a few minutes previous by tumbling over the precipice.

As it was, the sudden shove the man gave him swung his feet far over the edge. For an appreciable instant he was suspended at an angle of forty-five degrees, while his unsuspected enemy pushed against his body.

It was only an instant, for the footing was too treacherous to justify the man in pushing to his utmost.

The man drew back a little, and Hobart promptly swung to a perpendicular position, but not before the man caught him around the waist and strove mightily to wrench his hands from the bush that sustained him

There seemed to be the desperation of a maniac in his clutch and in his gusty breathing.

Hobart clung to the bush with equal desperation—with the sanity and grit of a man who sees death below him, death on the shelf of rock, death everywhere but on the cliff above, up which he might climb if once the enemy should give over sufficiently to enable him to draw his chin to the level of the bush-trunk.

To this end he writhed and kicked as best he could, but the man stuck so close to him that foot blows were ineffective.

Suddenly the man raised his own feet from the shelf while his arms still embraced Hobart's waist, thus adding his weight to Hobart's on the slender trunk of the bush.

It was one man too much. The sturdy bush did not break, but its roots tore from the scanty soil of the crevice. Feeling his support yield, Hobart let go and precipitated himself forward—that is, toward the face of the cliff, and so into the shallow cavern from which the man had appeared.

Both fell. For a moment the struggle continued, each trying now to get away from the other, for the man undoubtedly believed that Hobart would push him over the edge if possible, and Hobart certainly credited the other with the same murderous intent. Each strove, therefore, to withdraw to the utmost from the perilous edge.

Presently there was the full width of the cave between them, not more than six feet, and each on his hands and knees panted and glared at the other.

It was a wary moment, each seeming to feel that the slightest movement on the part of the other or himself would precipitate a renewal of hostilities.

Hobart dared not look elsewhere than at the eyes of his adversary, but when he concentrated his gaze on their contracted pupils he nevertheless was conscious of the week's rough growth of beard on the man's cheeks, of his closely cropped hair—and of the stripes on his blouse!

From the tail of his eye he even perceived at the back of the shallow cave a small bundle, which seemed to contain clothing and other articles.

The man's breathing became less labored. The intense hatred that burned in his eyes was somewhat subdued by an expression of wonder.

"Well," said Hobart, "it didn't pay, did it?"

"It didn't succeed," replied the other hoarsely; "but pay? Yes! You can't go back if I choose to prevent you, and you can't make me go back with you."

"But I haven't the slightest desire to make you go back with me."

The look of wonder, which had left the man's face when he spoke, returned, and he stared at Hobart a moment.

"Then what did you come down here for?" he asked.

"Isn't it enough that I didn't come for you?" Hobart returned, and when the man's lips twisted into an incredulous sneer, he pointed with his left hand to the edge of the cliff, but without directing his eyes that way. He dared not remove them from his adversary.

"No, you don't," said the man quite composedly, before Hobart had time to say what it was that he was pointing at. "You might as well understand right now that I'm not to be caught by any such fool trick as that."

"Trick!" echoed Hobart, genuinely surprised; "what trick?"

The man scowled, not in anger, but in expression of the amazing doubt that troubled him.

Was this young man in fashionable clothes really a chance wayfarer, who had stumbled accidentally on the unique hiding place, or was he, more likely, a hireling of the law, whose infernally keen eyes had seen footprints on the bare rocks above, or other indications that led straight to the almost impassable path down the cliff?

"You want to make me look one side," the man muttered, "so that you can jump on me."

"Oh!" said Hobart. "I see. You think I'm scheming to clap handcuffs on you and take you back where you came from. You are quite mistaken. I am not a detective."

"And I'm no thief!" cried the man, with startling energy. His face flushed hot, and the dangerous fire of hatred burned again in his suspicious eyes.

"Indeed!" Hobart responded indifferently. "What are you, then?"

"I was sent up for killing a man, if you want to know."

"That makes it so much more interesting," and Hobart ventured to let his gaze wander for a brief moment from the man's eyes, as if he were studying the specimen curiously.

CHAPTER II.

A Matter for Argument.

IT was with curiosity, but of the most important kind—a test to learn whether his strange companion were himself inclined to take sudden advantage of unwariness. The test satisfied Hobart.

"Now," he added almost in the same breath, "we shall get on better. I'm tired of kneeling. I'm going to stand up."

So saying, he arose and stretched himself for relief from the tension of the unusual and awkward attitude he had held since the end of the fight

But he was watchful at every instant, and it contented him to observe how the convict struggled with surprise and suspicion, the former emotion restraining him, the latter inducing a quiver of eyelids and face muscles indicative of readiness for action if need be.

That summed it up in Hobart's opinion. The man would fight again—if attacked but he was not disposed again to assume the offensive.

"You gave me quite a scare," said Hobart pleasantly.

"Scare!" echoed the convict sullenly. "How do you think I felt when I heard you coming down the cliff?"

"Horribly cut up, undoubtedly," Hobart answered. "I can quite imagine it. Your heart was in your mouth as you realized that you would be discovered. You were in despair because it seemed

the game was up. And then, quite suddenly, and all in the way of self-preservation, you determined on another murder."

The man's brows wrinkled as he followed this analysis, and he nodded in acknowledgment of its correctness, but at the last word his face flushed angrily again, and he cried:

"I'm not a murderer! I deny the term, and always did deny it. Every killing isn't a murder."

"Oh, well," Hobart interrupted soothingly, "it's a matter for argument, doubtless, and I shall be glad to hear your side; but you'll find it much more comfortable if you stand up."

The convict arose slowly, almost as if he were dazed—or hypnotized by the young man who had so narrowly escaped destruction at his hands.

"I've nothing to say," he muttered when he stood erect. "If you're not a deputy sheriff or a detective, what I did is nothing to you."

"Oh, yes it is! I'm a member of the community, and all crime, no matter how trivial or serious, affects me at least indirectly. I told you I liked argument. I'll expound that view if you fail to grasp it at once."

"I'm no fool," was the response, in the bitterest possible tone. "I see you understand me, and therefore I won't bore you with a discourse on sociology. I'd much rather hear you talk."

While he was speaking Hobart, quite as a matter of habit, sought for his cigarette case and matches, found them and proceeded to light a cigarette. Meantime, he kept his eyes on his companion, upon whose face came an unmistakable expression of eagerness. Hobart immediately proffered the case, and as quickly withdrew it.

"Excuse me," he said; "you'd probably prefer something with more body to it. You'd much rather have a cigar, wouldn't you?"

For the first time, the hard lines of the convict's face relaxed. His eyes, that had burned alternately with suspicion, wrath, and bitterness, glowed for a fleeting moment with gratitude. There was even a shadowy suggestion of a smile.

"I haven't had a cigar in eight years," he said huskily, and then forced a brief smile, as if in recognition of the grim humor of making so much of a cigar in comparison with the graver and more obvious deprivations to which he had been subjected. "Thanks," he added curtly, as if he had recovered the bitter pose with the conscious intent of being consistent, and stepped forward a pace to take the proffered comfort.

He took a match, too, and presently he blew slowly a cloud of smoke from his lips and watched it dissipate in the crisp morning air. He puffed again, and yet again, taking the cigar from his lips and throwing back his head, that he might see every faint wreath of smoke as it curled upward and disappeared.

During all this—and it lasted quite a minute—he kept the scowl on his brow and the hard lines about his mouth, and he never looked at Hobart, who, with folded arms, watched him interestedly, until, turning abruptly, the convict said. "There's no use trying to deny that this is a luxury. I'm just as much obliged as if—as if I was a free man."

"It does make a fellow feel better, doesn't it?" Hobart returned. "Especially after a long swear-off."

The convict grunted his approval, and possibly also his appreciation of Hobart's delicate way of referring to his long years of inability to indulge in cigars, but he made no articulate response.

"Well," said Hobart, casting away his half-consumed cigarette, "if you are not inclined to talk, I certainly don't want to press you, and as I'm hungry for breakfast I'll bid you good morning."

"No!" exclaimed the convict explosively. He squared his shoulders and poised the cigar between the tips of his fingers. "I'll chuck this," he added, "if you think 'twould be ungrateful in me to keep it, but I sha'n't let you go."

They eyed each other steadily for a moment, and each saw, passive but obvious, the same determination with which they had recently contended.

"Keep the cigar," said Hobart, with a light laugh. "We won't fight about it. We'll agree that there shall be no more of that, shall we?"

The convict was long in answering.

"Where I've been," he said slowly at last, "the argument is all on one side, and a man's mind dulls for lack of prac-

tise. So I have to think some before I agree to anything. There'll be no fight if you don't try to go."

"All right. For the sake of argument I agree to the amendment, and if I change my mind I pledge my honor that I'll let you know. That is, I won't try to go without your knowledge and consent."

"That's what I mean," said the convict. "Sounds judicial, though I don't remember that the words figured in my trial."

Hobart sat down and leaned his back comfortably against the wall of the cave. He lit another cigarette, while the convict seated himself opposite.

"I take it," Hobart said, "that you are utterly opposed to my going alone, and that you won't go with me. I think I can understand your thought in the matter. You'll take no possible risk of being betrayed into the hands of the law."

"That's it. You hit the nail on the head as well as most lawyers. Is that what you are?"

"No, neither lawyer nor detective. I'm simply a visitor at the hotel above here. Perhaps you know where it is?"

"I know."

"Well, then, to return to our subject, how do you purpose to end the situation?"

"I haven't got as far as that."

"You wouldn't dream of stirring from here in that suit not by daylight, at all events."

"No."

"And supposing I permitted you to go at night it wouldn't take me long to follow."

"I've thought of that."

"Your mind hasn't dulled as much as you seem to think. So "

"I might pitch you off the edge before I went."

"Ah! but remember our agreement. There would be a fight before you got me over the edge; and in such a fight, do I need to suggest, it would not be certain which of us would go over?"

"It's a good argument," said the convict.

"And leads to "

"I'm hanged if I know."

"Neither do I. I'm just as much puzzled as you are," and Hobart smiled affably. "I never was in such a situation, and never read of one just like it, so there's nothing to go by. And, worse yet, I think I see another complication that may not have occurred to you."

CHAPTER III.

"I'll Not Go Back Alive!"

AS Hobart finished, he pointed upward. This time the convict turned his head, but, after a brief stare in the direction indicated, he looked inquiringly at his companion.

"You don't see?" said Hobart. "What about the bush we let ourselves down by? It's gone. Even if it hadn't fallen down the cliff we couldn't set it back where it grew—"

"Damn!" exclaimed the convict, and it seemed that his face paled a bit.

"I don't think the absence of the bush presents a fatal difficulty," Hobart went on thoughtfully. "One of us could stand on the shoulders of the other, and so reach up to the next step above the bush. Whoever went up first could get a rope and let it down for the other."

"Yes," the convict admitted; "that's a way out. I'll go first."

"That wouldn't do at all," said Hobart decisively.

"Why not?"

"Because you couldn't get a rope without running great risks. Better let me go first."

"That's just as bad."

"Why?"

The convict hesitated long. "I've no fear that you wouldn't come with a rope," he said at length, "but I shouldn't care to meet the men you'd bring with you."

"I shouldn't bring anybody with me."

"Perhaps not."

"You distrust me, then?"

"I feel safer as it is."

"You evade the question."

"Out with it, then!" and the convict spoke with his formerly surly tone.

"There's been nothing in my experience to justify me in trusting my friends, let alone strangers; and there's nothing in this situation that exactly encourages a trustful disposition."

"I see the latter and can credit the former," said Hobart, as thoughtfully

as ever. "We haven't yet come to any light on the situation."

"I'm not so sure," said the convict. "You've suggested a way out, and I've stated plainly why I can't let you go first. You also indicated the risks if I go first, but the risks are largely a question of clothes. We're about the same build. I'm sure I could wear your clothes, and in them I'd pass simply for a swell pedestrian who hadn't troubled to shave for a few days. It would then be a simple thing to go to the hotel and get a rope—"

He stopped abruptly.

"Go on," said Hobart encouragingly.

The convict puffed smoke and scowled at his feet.

"You would get a rope," Hobart continued for him, "on the explanation that you heard a man cry for help as you walked along the top of the precipice. A dozen or score would come with you, and when I was pulled to the top in my striped suit, for I should have to put on your clothes, I should be recognized, and the question would be asked how I came to be so dressed. Like enough, my friends would recognize my clothes on you."

"You've hit it again," said the convict; "but suppose we wait till night. In the dark I could operate alone."

"And having my clothes on, there would be a great temptation to assure your freedom by leaving the neighborhood at once."

"Then there's distrust on both sides."

"I don't deny it, and you cannot deny that my distrust is reasonable."

"Well, I give it up," said the convict gloomily. "I'd risk getting away in your clothes, but if I tried to take them from you I suppose you'd resist?"

"I certainly would."

"And that's fight again, with all the risks you cleverly pointed out. I don't see what we're to do."

"Nor I, except to sit here and talk it over till we starve."

The convict looked doubtfully for a moment at the bundle at the back of the cave. Then he said:

"There's no need to starve in a hurry—that is, if you're not squeamish about eating stolen food."

"Under the circumstances I'm not," Hobart responded heartily. "Food will enable us to prolong the discussion, and so perhaps find a way to harmonize our differences."

"Mebbe," was the convict's dubious comment. "If we can save time by not going over and over the same ground Seems to me we've covered it all now, but if you're going to keep on thinking, start right now with this idea: I'm not going to be taken back to prison alive! There's no argument about that!"

"That's your irreducible minimum, is it?"

"I guess that's what it's called."

"But it isn't irreconcilable with your voluntary return to prison, is it?"

"What! Me? Go back of my own accord? Huh! That's too absurd to talk about, mister."

"Then we won't talk about it. What have you got to eat?"

The convict replied by removing the clothing that formed part of the bundle at the back of the cave, disclosing a quantity of bread and cooked meats.

Hungry though he was, it was not the food that interested Hobart, and brought a transient but satisfied smile to his face. He saw a possible means to an end—extrication from his peculiarly difficult situation—in that heap of cloth.

It was nothing more than the garments of a little girl.

It was a slender chance, perhaps, but it was a chance, and the only one in sight, and he set himself to cogitating how he could best make use of it.

"I was asleep when you began to climb down the ledge," said the convict, "so it's my breakfast time, too."

They ate in silence, the convict following his acquired habit of taciturnity, Hobart restlessly planning the attack he meant to make on the other's sensibilities.

"Just as good as if we'd paid for it," said Hobart at length, resorting again to tobacco and proffering the convict another cigar. It was accepted a bit ungraciously. The strange man had taken offense, as Hobart had hoped he would, at the allusion to the fact that the food was stolen.

"We'd get on better if you didn't harp on my theft," said he. "You don't gain anything by it."

"But I'm a man of argument," Ho-

bart responded, "and no good argument is founded on anything but truth. We're in for another long argument, you know, and I'm going to stick to facts in mine."

"So am I," was the almost angry retort, "though I don't know what you're going to argue about. But if you want facts, understand this: until six days ago I never had taken anything that didn't belong to me."

"I will believe that, and merely suggest how unfortunate it is that one crime leads to another."

The convict's face burned hot.

"There - you go again!" he cried. "I'm a criminal! Yes, rub it in! In the eyes of the law I'm a criminal!"

"And in your own eyes?"

The convict had spoken defiantly, looking his defiance straight at his companion, but now he lowered his eyes. He was silent so long that Hobart ventured again to prick the conscience that evidently lay beneath his prison-hardened exterior.

"You had not taken anything that did not belong to you, you said. Not even human life?"

At this the convict looked up again suddenly. The question was put gently, insinuatingly, but with no mean or exasperating tone, and the expression on Hobart's face was merely one of kindly curiosity.

"See here," said he of the striped suit, "don't you think it's dangerous to bait a man like me?"

"Not at all," was the calm reply, "but I deny the baiting. I am seeking information which will be a common ground on which we can come to an understanding. Dangerous? Certainly not! You tried to kill me, to be sure, but that was due to a mistaken impulse for self-preservation. Now you know the danger to yourself of trying it again, and, moreover, you are really anxious to persuade me that you are not as bad as your clothes suggest."

"You read a man's mind as if it was a printed book," the other muttered; "but all you can read there, after all, are impulses and inclinations. You can't see the facts of the past stored up there, can you? See here, sir; I *am* a criminal, and I'll tell you why.

"I never had any too much money, but I was not of the slums. I had as much schooling as other ordinary men, and I was brought up in honest ways, with pride in honesty, pride in earning what I possessed, and I was doing well enough in a material sense.

"I don't mean to say that I was a model; far from it. There were plenty of faults, but crookedness wasn't among them. I won't catalogue my faults, for you're keen enough to see them. I was married."

His voice wavered perceptibly, and for a moment he proceeded with palpable difficulty.

"My wife was my idol; my baby girl her only rival. There was a black-hearted hound whom I thought a friend. He was in straits, and I gave him shelter in my house and food at my table.

"He repaid me by trying to come between my wife and me. I deserve eternal damnation for believing he was in a way to succeed. I deserve prison for no other crime than that of even a momentary distrust of that loyal little woman, my wife.

"We quarreled, my wife and I. That is, I did the quarreling, and she, poor thing, did the helpless crying. The sight of her tears, even in my cursed distrust, maddened me. I swore I would kill the scoundrel at sight. Other tenants in the building heard me. I repeated my words as I rushed down the stairs to the street. 'I'll kill him!' said I, when a neighbor sought to restrain and calm me.

"That was in the early evening. Till nearly midnight I walked the streets. Looking for him? I'm not sure. I know that I suffered such pangs as a prison can't give. Remorse for thinking ill of my wife. Remorse for having spoken harshly to her. Consuming anxiety to see my little girl. But through it all I felt him, the traitor, somehow urging me on. Looking for him? I don't know. But I found him.

"I was not what you call a drinking man, though I took my dose whenever I wanted it, and about midnight I felt faint and something of the desperation, perhaps, that drives fools to drink in the delusion that it drowns their sorrows.

"I dropped into the first saloon I

came to and had my drink. Just as I finished it I became aware that he was standing at the same bar, for I heard his voice speaking insolently to the men who were with him. They were at the verge of a row. He had other enemies than me. I wasn't the only victim of his treachery.

"But no matter. I ran the length of the bar and pushed in among the men. 'This is my fight!' said I. I spat in his face! He raised his hand and I struck him."

CHAPTER IV.

"That Was a Lie!"

THE convict paused and relighted his cigar. After a puff or two he went on steadily:

"There was a general mix-up. I know that somebody grabbed my arm and that I shook him off. I struck that hound again and we went down, several of us, in a sprawling heap.

"He was the only man who didn't get up. There was a knife sticking into his heart.

"It was said on the witness-stand that I seized that knife from one in the crowd and dealt the blow. That was a lie. I saw no knife till I stood up and saw the handle sticking up from his breast

"You see the evidence. I don't need to put it all together for a man as keen as you are, but this is the point for you and me: I am a criminal because murder was in my heart when I struck that man. I would not have stayed my bare fist if I had known that the blow would be fatal to him.

"What difference does it make that it was another enemy who got in the death thrust? I was a murderer in intent, and you may say that I was a murderer in fact, for when I saw what was the case I felt no twinge of remorse, but I raised my fist above my head and cried: 'It served him right!' And it did.

"But afterward, when I was in jail awaiting trial, I thought of my justification, or, if you like it better, the extenuating circumstances, and I became quite clear in my own mind that although I had done a killing in intent, I was not a murderer in the ordinary sense.

"And I say so still. The jury called it manslaughter, and the judge said it was imprisonment for life.

"Life! Do you know what that means? You lock-step to work, and long through the day for the relief of the dark cell. You lock-step to your cell, and long for the work as a relief to the grisly solitude.

"You work, work, work—not for accumulation, not for the sustenance of your family, but because the wise men who made the law have found that a man lives longer for exercise than without it.

"You sleep and eat because thus your punishment may endure the longer.

"Life! No commutation for good behavior. You curse the silence of the cell corridor; you curse the noise of the shops; you curse the walls around the yard; you curse the darkness because you cannot see; you curse the light because it reminds you of the great outside—until one day you come to regard madness as worse than living death, and you drop into a torpor wherein you are indifferent whether you work or not.

"You are indifferent to darkness, indifferent to light, indifferent to the dull relief from routine that comes with Sunday; but always you have on the stripes that remind you there is a difference.

"There was one sad joy for me—the periodical visits of my wife and little one. I looked forward to them with eagerness and yet such pain that sometimes I wasn't sure that I wanted them to come

"I did say finally that the little one should come no more. She was growing old enough to ask why, and to remember, and I told the wife she ought not to grow up with the awful consciousness that her father was a life-prisoner.

"It was too late. Already the child remembered, and she cried so piteously when she wasn't permitted to pay the visit that my little woman couldn't leave her at home."

For a moment the convict chewed his cigar viciously, then lit it and smoked. Eyes to the ground, he continued:

"I was well behaved and came to be a sort of trusty. One evening, six days ago, I had occasion to be in the yard after the rest of the gang had marched to their cells.

"There had been some painting on one of the outside walls of a shop. The job was done, but the workmen hadn't removed all their materials.

"It was such a piece of carelessness as will happen once in a hundred years anywhere, such carelessness as leads to any serious consequences only once in a thousand times

"The demolished scaffolding lay in the angle of the shop building and the yard wall. One of the scaffold ropes, unrove from its fastenings, lay on a pile of boards.

"It was after sunset and just at the time of changing guards, when, if ever, a convict has one chance in a million to escape. A combination of few factors, but they seldom shape themselves right the man, the means, the time. I saw all three as if I stood apart looking at myself.

"An awful awakening fairly crazed me! My torpor sluffed off; I was alive again; I answered to the call of the outside!

"There was no time to plan anything. I leaped to the pile of boards, caught up the rope, and made a noose in one end!

"I threw it. Luck was with me in every move. The noose caught on a spike at the wall top and held. I climbed up, cast the rope down on the outside, descended, and ran.

"I suppose it was not thirty seconds from the time when I saw the opportunity until I was out of sight in the darkness

"I don't know when my absence was discovered. That I was pursued may go without saying; but I never saw or heard my pursuers.

"Luck came again to justify my course, for I wandered at night aimlessly, robbing kitchens and gardens for food, sleeping in the open—once under a haymow, once in a corn crib.

"But the fear of capture was strong on me, and when I had been climbing this mountain long enough to realize that it was a mountain, I kept on deliberately till I reached the top and found this refuge. It seemed so secure! so impossible of finding! and here we are."

CHAPTER V.

Always the Hunger.

HE stopped abruptly. Hobart allowed some time to elapse and then said quietly:

"The true story of William Carew."

The convict leaped to his feet.

"Then you are a detective!" he cried.

"Nonsense!" Hobart retorted, without stirring. "I read the papers. Hasn't it occurred to you that the reporters have made copy of your escape and retold your bitter experience from their imperfect knowledge?"

After a pause: "Yes, I suppose so," and William Carew sat down again.

"There's a little more to tell," Hobart suggested, and when Carew looked inquiringly at him, he added: "That dress."

"Ha!" exclaimed Carew, "my anti-climax. Here as elsewhere I had to have food. It was an easy job to break into the hotel kitchen if it hadn't been I couldn't have done it—and I got my food supply. But that was the least of my troubles.

"I dared not show myself by day; I feared to pass people even at night. I had to have clothes. Here again seemed to be my opportunity. I was in a hotel, a much better field for a thief than the farmhouses where I had requisitioned provisions on other nights. I trusted my luck on the final effort to get me the means of real freedom.

"Everything seemed ridiculously easy, for I got up-stairs and into a corridor without arousing anybody. I tried door after door, finding all locked or the room empty, but at last a door yielded, and the sound of a sleeper turning in bed told me the room was occupied.

"I slipped in. It was pitch dark. I felt about till my hands found a chair with clothes laid out on it. I seized them and backed away, returned to the kitchen, went out by the window I had forced open, hurried to this hiding-place, and waited for day to see what I had stolen—a child's dress!

"That was yesterday, and I haven't

stirred from here since. I hadn't the nerve."

"The theft of the child's clothes made a great sensation at the hotel," said Hobart reflectively. "It seemed so mysterious. The little victim was pitifully distressed. She had other clothes, but attached to the stolen garments was a locket somehow associated with her father. She prized it dearly and wept bitterly over its loss. I presume you dropped it somewhere."

"Yes," muttered Carew, almost inaudibly. "I thrust it into my pocket. I thought you see, if I must steal, it seemed—well, I thought of selling it somewhere. Here it is. I want you to return it to her."

"It will give me real pleasure to do so," said Hobart, taking the locket and holding it while he reached across the cave and lifted the dress. "I should say," he added, "that this would be about the size of your own little girl's garments. Is she about nine or ten years old?"

"Just short of ten," replied Carew huskily.

"H'm—did you open the locket?"

"No," and Carew looked his wonder at the question. Then of a sudden his eyes bulged and he fell to trembling. "For God's sake, sir," he choked, hardly able to control his utterance, "you don't mean to say that by some strange chance I've stolen my own little Mary's clothes? Is my wife staying at the hotel? Is she working there? She might have given little Mary the locket. Let me see it!"

"My dear fellow," said Hobart, "we are not actors in a melodrama. Your imagination runs away with you. No, the victim of your theft was not your daughter. See," and he held forth the locket, open, and showing a miniature of a man's face. It was not Carew's. It was the picture of nobody he knew.

The convict sighed as he looked at it. He leaned back against the rock, the embodiment of dejection, emotionally exhausted by the excitement of telling his story and rising, through Hobart's painfully clever suggestion, to a climax of disappointment.

Hobart, however, was not yet done with inflicting pain.

"Your victim was a stranger," said he softly, "a dear little girl, until yesterday morning happy in spite of the sorrow which has clouded her life since the original of this picture passed away."

"Don't! For God's sake, don't!" groaned Carew. "Take it back to her! I'll help you up the cliff!"

"I'm not quite ready to go," Hobart responded. "There are one or two points in your story that I want to review. Don't protest, man! I know you've told the truth; but somewhere in your narrative you spoke of the 'real freedom' an innocent garb would give you.

"Aren't you fatally mistaken about that? You've had six days of relative freedom, and to what has it led? Theft, theft, and more theft. You may be exculpated in the eyes of candid men for the deed that sent you to prison, but in your relative freedom you are piling up dishonor that neither the law nor yourself can condone.

"And you have only begun. You have gone from bodily imprisonment to a dungeon where your soul and honor both suffer increasing torments. Suppose you had found a man's clothes? What then? Could you have done aught but wander, hunted and hiding, starting a new life somewhere, perhaps, but under false colors and with the certainty of exposure if you should send for wife and child to join you?

"What would become of the one uplift you had? the one compensation for continued living within the gray walls of State prison? You saw your wife and daughter periodically. That was something even though the visits were filled with sorrow. What anxieties that wife must be suffering now!

"And with every step you take in this relative freedom, this worse than imprisonment, you are adding to her sorrow and putting yourself farther and farther from the possibility of seeing your little girl."

Carew held up his hand imploringly.

"Wait," he whispered. "If I could be sure of getting unmolested, uncaptured to the prison gate, I'd go back! You are killing me with your infernal logic! I'll try to go back, anyway, but if you can help me to effect a wholly voluntary return—"

"That's just what I've been waiting

for, Carew," cried Hobart joyously. "Now you can lift me to the level of our vanished bush! You shall have my clothes and money to pay for your ticket on the railroad. You shall start this evening, after dusk, and arrive at the prison gate by midnight.

"Will you trust me? Of course you will. And will you pledge me your honor—you've plenty of it, my friend, I'll bank on it—that no reflection during the long day will induce you to change your mind?"

"I'm sick, tired, all in," Carew returned gloomily. "You can't expect me to be enthusiastic, but you can count on me. You'll bring a rope, I suppose?"

"Yes, shake hands on it. Here, take my cigars. They'll help time to pass. You've plenty to eat. Be patient—"

"No fear. I've had training in idleness."

"Let it strengthen you for this day, then. Now for your shoulder as a step, please."

"Aren't you going to take the girl's dress?"

"Not till to-night. I mustn't risk questions. I can get back to the hotel now before I am missed."

Carew stepped to the edge of the rock-shelf and faced the cliff. A momentary apprehension flashed in his weary eyes. "You'll come alone," he stammered, and then, "No! don't tell me you will. I trust you."

He knelt under the spot where once the bush grew. Hobart stepped gingerly on his shoulders, steadying himself with hands flat against the bare rock. The convict took a long breath and got one foot under him.

"I'm no acrobat," he muttered, "but if you can hold hard—"

"Take your time," said Hobart between clenched teeth.

The striped shoulders swayed, the striped knees knocked together as very slowly Hobart's hands slid up the rock above the crevice that had held the bush.

"A little higher," said he, and wondered if his voice sounded as choked as it seemed to himself. The striped legs straightened, the striped back came trembling to the perpendicular

"All right," from above, as Hobart grasped a projecting nub and dug his toes into the crevice.

"Thank God!" from below, as the convict sank panting upon the shelf.

Hobart climbed as deliberately as he had descended, pausing not at all, but never hurrying, and so presently drew himself over the edge and lay full length on the top. His heart was beating violently, his limbs were unstrung; it almost seemed as if he must lie there an hour to recover from something that he knew was not the exhaustion of climbing.

But it was less than a minute before he knelt, facing the valley, and looked down at the shelf that had been his prison cell.

"Hello, Carew," he called.

"Hello!" came from the shelf, and the convict looked up at him.

"All right below?"

"Yes, all right."

"Till evening, then. Good-by."

Hobart arrived at the hotel just before the head waiter closed the breakfast-room door. He made a pretense at eating, for now he was oppressed by such a fear as the convict himself must have known that anything unusual in his conduct would attract attention and inspire questions that he could not answer without courting exposure of his plan.

CHAPTER VI.

"Unofficially, of Course."

IT was a long, tedious day. His spirit hovered ever on the shelf over the deep valley. After inventing and weighing, only to abandon, a dozen different excuses for asking the loan of a rope, he asked for one without excuse and obtained it.

Why should the head stableman ask a guest what he wanted with a rope? It was quite enough to pocket the generous tip for the slight service.

That was all that could be done until evening in the way of preparation; but as soon as dusk came Hobart carefully lowered his grip from his window, strolled casually around the house, found it, and strode rapidly to the scene of his morning adventure.

He wondered with such apprehension

as a man may feel who goes to dig up buried treasure whether Carew might have found some way to escape, whether he had changed his mind.

"Carew," he said softly, kneeling once more at the edge.

"Yes," came from below.

"Good! Wait a moment."

Hobart tied one end of the rope around a tree and lowered the other.

"Freight first," said Carew, fussing with the free end. Then: "Pull away!" and Hobart raised the bundle that comprised the convict's loot from the hotel.

"Now for yourself," said Hobart, lowering the rope again; "but, Carew!"

"Yes?"

"Can you see a little red flower growing on the edge of the shelf?"

"Yes. What of it?"

"I want it."

A pause—and the hempen fabric strained. There was a sound of scraping on the face of the cliff. In less time than Hobart had taken to make the ascent, Carew was at the top.

"Here's your flower," he said.

"It was what I went down for this morning," Hobart replied, grasping the man's hand and peering into his eyes. In the fading light he saw the somber, set expression, the look of a man who had abandoned hope, but whose will was inflexibly fixed upon a purpose.

"Now," said Hobart briskly, "there's no time to waste. Take off your clothes and put on mine," and he opened the grip.

The change was effected quickly and the striped suit packed in place of Hobart's. Then Hobart conducted the convict straight across the mountain-top and down the steep until they came to the road from the hotel to the railroad station. There they parted.

"Carew," said Hobart, placing both hands on the man's shoulders, "your train leaves at nine. You've an hour and a half, and steady walking will make it. Express my clothes in the grip back to me at the hotel—"

"Wait a minute," Carew interrupted. "You haven't told me who you are."

"It doesn't matter. You may know some time. My initials are on the grip. It will reach me with those letters only for address. Don't think me frivolous or ironical, for I am in deadly earnest in just this: I do hope good luck will attend you on your return journey. Good-by."

The convict responded almost inaudibly, and plunged at once into the darkness of the mountain-road.

Hobart went thoughtfully back to the hotel, where he contributed no end of interest to the evening by restoring to a grieved little girl the dress and locket that had been stolen and that he had stumbled on in the course of his walk.

A fortnight later, the Governor of the State, just returned from his vacation, sat in the executive chamber listening to a story by his private secretary.

"He must have been unmolested on the return journey," the secretary concluded, "for, as you have doubtless read in the newspapers, he routed out the prison officials at midnight and demanded admission. My grip and clothes were delivered at the hotel by an express company two days afterward."

"You had a remarkable adventure," said the Governor, "and you were instrumental, it seems, in restoring an escaped convict to the State. On these grounds, one or both, do I understand that you wish me to exercise executive clemency?"

"No, sir," replied Hobart, "on the ground that in the further imprisonment of this man the community will lose the services of a good citizen. You see, sir," he continued eagerly, "under the circumstances, Carew must have told me the truth. He has been punished abundantly for the crime of which he was guilty in intent only. The petition for clemency of which I spoke as an introduction to my story is not my own. Here it is."

He laid a document on the table.

"You will find there the signatures of all the jurymen in the case, of the district attorney who prosecuted it, of Carew's employers, and of some other reputable men who know him. They ask for a full pardon."

"You meant, Hobart, that you ask it through them. Don't tell me this isn't your petition."

"Well, sir, after I received my grip I spent the rest of my vacation hunting up the persons and soliciting their signatures, but I acted unofficially, sir."

"I see. Just a little flier when off duty. No mention, of course, that you had a 'pull' with the Governor," and the chief executive smiled quizzically.

"I did not mention my official position to anybody who did not already know it, sir."

The Governor glanced at the petition. "But, see here, Hobart," he said, "this man committed another offense in breaking jail."

"And he returned voluntarily, sir."

"Oh, yes, I forgot. Urged by very strong but unofficial influence!"

"He doesn't know to this day who I am."

"You are very much interested in this matter, Hobart."

"I am, sir."

"Well, my term expires in three months. If the man behaves well meantime, I might make it my last executive act and give him his freedom as a New Year's present."

Hobart's eyes brightened. "Thank you, sir," he said, "but it does seem a pity, doesn't it, to risk his making some little slip in that period? I think I will write him — give him a gentle hint to be on his good behavior for three months."

The Governor interrupted with a hearty laugh. "Unofficially, of course?" he queried.

"To be sure, sir, though I've no doubt the prison warden will be able to give Carew the value that may attach to my signature to such a letter."

"Without doubt," responded the amused Governor. "The warden knows who you are, and after he has inspected your letter he won't make it hard for your convict friend to behave himself. But write your unofficial letter, Hobart, as soon as you get a breathing spell. I want now to look over the correspondence relative to appointments to the railway commission."

(The End.)

MR. SUN YAT SEN VISITS JAPAN.

MR SUN YAT SEN, whose fame is noted worldover as the foremost man in China's great revolution, has been in Japan last two weeks, and received enthusiastic welcome of the nation, from cabinet minister to down even meanest artisans. The great revolutionalist's visit to his second mother-country, (that is what Mr. Sun calles this country, for the reason that he has lived in Japan for almost thirty years, previous to the great political change in China, studying and planning the great task of revolution) according to his own statement, is of semi-official character. He was made by the president Yuan Shi Kai the head of whole Chinese Railway System, and his one mission in this country is, beside that of social one, meeting with his old friends, to study Japanese Railway system and management, in order to improve his Railway Scheme in Chinese Republic. His Railway Schemes as we once mentioned in these columns, is said to build 200,000 miles of Railways in China, some of them with Chinese money and materials but greatest part of it with foreign money and materials.

Without regard to his being the Railway president of China he is certainly one of greatest living man if not the greatest, in the far east.—*The Railway Times, Tokyo, Japan.*

WHAT OUR THIRSTY ENGINES DRINK.

ONE American railroad, 6,500 miles in length, uses annually 16,500,000,000 gallons of water. Another on 2,000 miles uses 5,736,838,000 gallons. Reduced to an average per mile, 2,703,440 may be taken as a fair mean water consumption per mile of line. Reports for the last fiscal year show that on June 30, 1912, there were 248,888 miles of line in the United States. Figuring the yearly water consumption for the total mileage, the aggregate is 672,853,774,720 gallons of water. The figure is one so far beyond comprehension that it means practically nothing within the scope of every day calculations.

The yearly railroad consumption reaches approximately 89,951,040,000 cubic feet. This would fill a reservoir 1,000 feet wide, 10 feet deep, and more than 1,700 miles in length, a channel one-fifth mile wide and 10 feet deep from St. Paul to the Gulf of Mexico. It would take a slice off of Lake Michigan 10 feet deep, a mile wide, and running from end to end, more than 300 miles.—*Railway Herald.*

Honk and Horace.

BY EMMET F. HARTE.

Our Old Friends Take Their First Annual Vacation and, as Usual, Do All the Work.

I WONDER who first introduced the nefarious practise of going on vacations—of deliberately seeking out some remote and unfamiliar spot, and going there in person for the avowed purpose of absorbing ozone, sunshine, fish, game, mosquito bites, renewed vitality, sand-burrs, rest, and change! Who was he?

I demand the name and address of the rascal!

Of course, after a few months of being pleasantly occupied at our work in Valhalla, healthily engaged in the daily tasks that promote the circulation, promulgate the digestion, and insure sound sleep and a zest for life generally, Honk and I must needs get ourselves inoculated with a foolish bacillus to the effect that we needed a vacation.

I know, I know. Nobody need say a word. I know that the place to rest is in your own bed, and that there's no camp ever yet contrived that affords half the comfort of home-be-it-ever-so-humble; but, well, maybe our camping trip would've been tolerable pleasant, after all, if it hadn't been for—but wait till I tell you.

We got a week off.

"Well, where'll we go, Horace, old campaigner?" asked Honk. "Mountains or seashore?"

"I," said I shortly, "am going fishing. I'm a physical and mental wreck. (I wonder if I really believed that?) I must have rest and change. Also absolute quiet. I shall take 'em both, too; by force, if necessary."

"Now, don't flare up like a flambeau going off half-cocked," he said; "nobody's going to say you nay. Since you've mentioned it, I wouldn't mind a little nature-dawdling myself. Do you know of a good place—"

"I know of a thousand good places," I admitted. "I've been reading tourist folders for a week. But where I'm actually going is to Speckled Trout Lake, twenty miles west of here, in the Mystic Hills. I'm told that the fish are so voracious there that you have to hide behind a tree to bait your hook."

"Whoop la!" he shouted. "That's the first time I've heard that one since '88, but I'm for you. The hunting's fine up there, no doubt, and it's the open season. Grouse, antelope, blacktail, bear, bobcats—gee!"

"Probably," I said; "but I am strictly a fisherman. I go for the single and express purpose of fishing for fishes."

Nor had it been my idea to stir up a great to-do about starting off on an ordinary camping-trip. No. But Honk made as much fuss over buying a few guns, shooting-coat, ammunition, etc., as a nation going to war.

He hustled about, pricing bowie-knives and insulated bottles, and telling everybody in town about our prospective jaunt. Incidentally, when this or that envious friend took occasion to wish us good luck, and also to regret that he wasn't going, too, we freely invited one and all to drop out informally and visit us in camp whenever they felt like it, and bring their friends.

Both Honk and I invited a lot of 'em

in this careless way. We did it without thinking—spontaneously, in the spirit of politeness and good-fellowship, and

Meanwhile, we chartered three sea-going burros to carry camp-kit, tent, arms, tackle, provisions, and other accessories to the scene of our projected inactivities

On a beatific Wednesday morning, with everything arranged, paraphernalia all packed, and ourselves suffused with high hope, we hit the westward-ho trail with our cavalcade

It was a fine day. Once out under the cadet blue infinity of the azure empyrean, we both of us felt considerably contaminated with inspirations and ecstasies of a rapturous and poetic nature.

"See," said Honk, waving his hands, while I sat down to exorcise a six-cornered pebble that was deadheading a ride in my starboard shoe; "see the stately, sentinel shapes of the eternal hills! See the golden mist blending with the purpling haze! Gaze upon the far-flung panorama of peak and crag and cañon! A sea of vivid colors! A chaos of reds, blues, greens, and yellows! Is't not sublime, Horace?"

"It is," I agreed, rising. "It's entirely pretty. Giddap."

I have mentioned the word trail. Perchance you may be palpitating under the pardonable misconception that 'twas a primitive path we traversed.

The trail, so called, was in reality a macadam driveway for automobiles, smooth and safe, extending for fifty miles. True, our destination, Speckled Trout Lake, was a little ways off the main boulevard, but even the by-road that led thither might easily be negotiated by a blind man driving a skittish team hitched to a dray.

We traveled by pack-train merely as a concession to romance and picturesqueness, and also for exercise. We got a surfeit of the latter. The final mile must have been ten thousand feet in length, besides being all up-hill.

Nightfall had descended ere we debouched upon the calm, quiet shore of the stilly lake. Being just a wee mite unused to twenty-mile walks, Honk and I were somewhat fatigued. I may say that we were almost all in.

We tethered the canaries to trees, slipped their packs, and, with one last effort, gobbled a few sandwiches apiece and turned in. We were, in fact, too winded to inflate the air mattresses, so each swathed himself in a blanket and slept on the softest rock he could find without extended search, under the star-blinky dome of the overarching cerulean.

Honk awoke, chilled, rheumatic, querulous, complaining of stiff neck, earache, and shooting pains. I felt like a different person. I was sore in spots, ranging from my eyebrows downward, and my blood had entirely suspended circulation

I got to my feet after the manner of a very old stiff—I mean a very stiff old man and glared about me. The lake lay a silver mirror set in its—er—setting of purple, pine-clad hills. Red and shell-pink and ruddy golden clouds floated fleecily in the amethyst abyss of the sky. But one can't eat such things. I wanted my coffee.

The burros seemed to be standing around at ease wherever they happened to be standing, all apparently well and unworried. A mountain canary is an odd fish. He's happiest when he's saddest.

Standing with reluctant feet on the dizzy brink of a cliff overhanging an unfathomable chasm or couchant on a bare spot in the middle of a valley, with hay in his shaggy wool and a tear in his eye, he snoozes or stares as the mood moves him, with a solemnity that has no parallel in zoology. An owl is a cut-up in comparison.

It was up to us two old codgers to cook breakfast, unpack, and establish camp. Honk doddered down to the lake for water, while I contrived, with many puffings and gruntings, to start a fire, after which we ate a few lines of bacon, flapjacks, and coffee, and commenced to feel whole heaps better, younger, more chipper, and efficacious, and all that.

Our burden of years dropped from us like fleas deserting a doctored dog as the revivifying sunshine, ozone, and dyspepsia cure got in their work.

Singing, we put up the tent and strewed the immediate proximity of the vicinity with the thousand and one things required to make up a first-class camp.

Presently order grew out of chaos. We found a place for everything and everything rested neatly in its place

By eleven o'clock, in great spirits, Honk danced about sighting rifles at imaginary deer, while I flayed the spuds for the beef stew. Dinner prepared, we ate ravenously. Nothing like the woods to give a fellow an ap—but that's an old one

Dinner encompassed, we slathered into the dish-washing, chuckling the while with anticipation of the long afternoon's delightful beguilement with rod and gun. We—at which point there came the faint honk-honk of a motor-car horn from the lavender glimmer of the middle distance. Wondering, we pricked up two pairs of listening ears

The suspense was short

Heaving and rolling like a cat-boat in a ground swell, came a big sorrel touring-car with six men. They tacked in and hove to with a screak in our waiting presence

Out hopped Ivison, cashier of the First National Bank; Harry Higgins, manager of the Valhalla Gas Company; Armitage, sportsman; Doc Pillsbury, physician and philosopher; and Clancy Chitwood um, ah!

All were laden with rifles, pump-guns, and fishing-tackle. The sixth man did not get down. I looked again, and saw that he was Ivison's chauffeur. But some six or eight lop-eared dogs which had been tucked away in the hull of the car got down and frolicked about in great glee

"We tried to make connections for dinner," trilled Armitage. "Did we?"

"Betcher life!" shouted Honk.

HONK MADE AS MUCH FUSS AS A NATION GOING TO WAR

"You're just in time. Dinner'll be ready *prontito!* Make yourself at home till we ring the horn. The camp is yours, gentlemen."

"Hear, hear!" our guests cackled in chorus "Don't go to any extra trouble. Plain fare's the word, just so there's plenty of it"

Honk and I made a run for the dying camp-fire to get busy with some high-speed, short-order cooking.

"We must do ourselves proud," he told me, aside. "There's not one of those fellows but would go the limit to show us a good time. They have already, in fact. It's up to us to return hospitality for hospitality."

"Sure!" said I. "Right you are! Slice some more bacon and toss me the pepper."

It was a good dinner, if I do say it. Eggs—half of our entire supply—fried ham, broiled bacon, potato chips, stewed tomatoes, canned baked beans, corn cakes, pickles, canned pineapple, raspberry jam—yes, I've seen lots worse dinners.

Our guests seemed to appreciate the spread, too. They cleaned up everything in sight, singing chansons of praise and toasting us from tin cups. With faces shining with ham gravy, they burbled about the "pleasures in the pathless woods" and "the rapture on the lonely shore."

At two o'clock, dinner over, the five deemed it high time to engage in well, what they had really come for. So guns and fish-poles were unlimbered, and away they scampered, leaving Honk and me to clean up the débris of the banquet board. Ivison's man took the car back to town. I heard Ivison tell him to call for them—I thought he said Sunday, but it might have been Monday.

I pondered.

Some time later, our chores done, Honk and I, with our trusty pipes, sat perched on a convenient log for a brief breathing spell.

"Um-m," yawned Honk. "If I wasn't so fagged out, I'd scout around for a mess of young squirrels for supper. What's the matter, Horace, that you're not fishing? I thought—"

"Er—I—it's getting late," I murmured; "and I'm sort of resting. Just a little petered out. I think it's the altitude. Maybe I'll set a few night-lines after supper, though."

It happened, however, that I didn't. Ivison brought in a fine string of bass and perch, and Higgins, Armitage, and Doc hit camp with full bags of birds and other small game to be cleaned and cooked for supper.

If supper was a bit late withal, nevertheless 'twas an orgy. Nobody ever had a better time than our visitors had on that occasion.

By ten o'clock Honk and I had finished washing and drying the supper dishes, made our company comfortable for the night with our own pneumatic beds and blankets, and had fallen exhausted, to make shift as best we could on a sand-dune apiece.

We slept direfully.

Dawn, followed by sunrise. It arrived on time to the second. There was some talk in regard to the dewy freshness of the sun-kissed mountains, the balsamic fragrance of the rippling lake, the silvery sheen of the plumed pines, and so on—but Honk and I, having breakfast to get, had no time to fool away on such foolishness.

Soon afterward our happy guests scattered joyfully to the clarion summons of lake and forest—warning us, however, that they'd return for dinner. Maybe not right on the dot, but somewhere thereabouts, and—anyhow, when they did return they promised to come hungry.

Any practical housekeeper will tell you that a guest of this haphazard character upsets the cherished system and traditions of the best regulated household. After we'd cleaned up the breakfast muss, Honk thought it advisable to build a series of pine-bough bunks for those present who were shy the more comfortable appointment of an air mattress—declaring that another night's repose on the hard bosom of Mama Earth would be for his undoing.

"One thing is apparent to the naked eye," he observed betimes. "The boys are sure enjoying themselves. We'll go down in history as dispensers of the real, old, genuine, ninety-nine per cent pure brand of hospitality; eh, Horace? For my part, I'm glad to be able to return some of the courtesies these good fellows have shown us in the past. I want 'em to have the best time imaginable."

"Uh-huh," I assented but with no answering thrill. "What're we going to have for dinner?"

Hank consulted his chronometer.

"By Jove, that's right," he said, jumping up. "It's nearing that time o' day. We'll have to hustle."

By serious thought and arduous effort we achieved another savory spread; but nobody came at the proper time to eat it. Our boarders were late. We waited for half an hour, keeping various comestibles warm by shuffling them on and off the fire

One o'clock came and went. One-

thirty. At a quarter to two several dogs galloped into camp. Then came Armitage, with the rest of his canines, accompanied by Clancy Chitwood. Armitage declared that he was in the last stage of starvation, so we served dinner.

That dinner disappeared like a snowball in August.

Clancy was hungry, too, it seemed. One thing I thought rather thoughtless in Armitage was the easy generosity he displayed in tossing grouse wings, drum-sticks, and even whole squirrels, from the platter to his waiting dogs, to be gobbled up in one-tenth the time it had taken me to clean and cook them.

I mentioned this to Honk

"Ah, ahem!" I said; "I'd suggest that you suggest to P. Q. that there's plenty of raw meat for his pups, without—"

"Sh!" said Honk. "I've heard him say that they won't eat anything but cooked food. He trains 'em that way You know, Horace, we're bound to show our friends every courtesy within our power. We simply wouldn't dare to—"

"Humph!" I returned. "Humph!"

Honk drew himself up with as much dignity as a smutty nose and tearful eyes from camp-fire smoke would allow.

"Fie on you!" he said.

When the two diners, assisted by the dogs, had cleaned up everything we had cooked, of course Ivison, Pillsbury, and Higgins rolled in, rollicking and ravenous. The two groups of guests—one fed and happy, the other hungry and impatient—sat around swapping yarns until Honk and I had assembled another meal, which the late comers fell upon as famished wolves fall upon their quarry.

While galloping through the intricate evolutions of footman, butler, and flunkies-in-waiting to the feeders, I caught snatches of confab anent a matter of large interest, nimrodically speaking.

Ivison and Higgins, it seemed, had run afoul of an old fellow—an ex-prospecter, trapper, scout, guide, and bear-slayer—who lived in a cabin a few *varas* beyond the coulee nearest to a *mesa*, or some such place.

THE FINAL MILE MUST HAVE BEEN TEN THOUSAND FEET IN LENGTH

This person had filled them full of tales about a blaze-faced mountain lion a fierce varmint with tiger bands on its body—that had lately been terrorizing the Mystic Hills country, carrying off sheep, calves, pigs, *et cetera*, and killing an occasional Mexican herder just for recreation.

Ivison gave notice in clarion tones that he intended to garner the pelt of said beast, willy nilly, for a library rug.

"Not so," interposed Armitage arbitrarily. "Rather 'tis I who will harvest the hide of the marauder. I'll wager forty cents that I'm the man that gets him!"

"But what about me?" demanded Doc Pillsbury, with some truculence. "I've already selected the spot on the wall of my consulting-room which is to be adorned with the epidermal envelope of this particular cat."

Higgins and Chitwood also made assertions, less bombastically, 'tis true. I judged that Clancy, for one, made his talk with mental reservations.

He expected to deliberately seek out and slay the ferocious beast right away—not. Honk, being in his own opinion an authority on game and the pursuit and capture thereof, essayed twice or thrice to gimlet his way into the powwow, but nobody seemed to hear him. A cook is merely a cook.

Soon afterward the heartened and enthusiastic sportsmen swaggered forth once more on the chase. I said nothing while Honk and I tentatively cooked for ourselves a stack of flapjacks and munched the running-gears of a grouse that weren't considered worth flinging to the dogs.

I said nothing while we washed the dishes and the cooking pots and pans; but when Honk began to cogitate out loud in regard to the probable constituents of the supper which was already impending again, I indulged myself in a few pertinent remarks.

"This is Friday," I muttered. "Friday in the afternoon."

"Quite so," said Honk. "What of it?"

"We've been here two days," I went on in a monotone.

"So we have—or soon will be. Why?"

"I dunno," said I moodily. "I was just wondering. We seem to keep confoundedly busy cooking and slaveying. When do you apprehend that we'll find time to hunt or fish a few minutes for ourselves?"

"Tut tut, Horace," he soothed. "Our time's coming. Don't worry. You're not grouching at our guests, surely."

"What'd Clancy Chitwood ever do for us?" I queried. "Or Harry Higgins?"

"Why—why—I don't just remember. They've set up the cigars, and er—"

"Then give 'em a dime apiece and call it square," said I. "As for Armitage, and Doc, and Ivison—of course, I think a lot of them, but there's that swarm of dogs eating the game faster than we can cook it! And what about this lion business? D'you think I want to be pounced on some night while I'm asleep, and all mussed up and clawed and chewed into mincemeat by a mountain lion? Ugh! I think I'll mosey back to town."

Honk gave way to a species of specious laughter. He cackled with great glee.

"My dear boy," he said brokenly, "you will be the death of me yet. You surely don't credit that cock-and-bull story of Ivison. Don't you understand that somebody's been stringing those fellows? I doubt if there's been a puma in these parts for thirty years. I tried to tell 'em so, but they paid no attention to me. Cheer up, Horace; you're in no danger whatever."

I felt considerably relieved, and set to work at my squirrel-skinning in the fleeting hope that I'd get the job done in time to fish a few minutes before supper. But somehow I didn't. Supper-time came too soon.

It was a merry company that gathered around the mess table that evening. And eat! Wurra, wurra! Never have I beheld such trenchering.

Luckily, the day's bag of fish and game had been plenteous, for they encompassed all we originally prepared and another meal or two in addition. Honk skinned and cleaned, while I perspired over pot and skillet.

While we labored the day departed and the darkling shadows of night gathered. The winking stars looked down and winked at each other to see Honk and me, bent and begrimed, slaving in order that a lot of yelping dogs and their masters might eat their fill.

We fell exhausted just before time to start breakfast.

Having breakfasted the outfit in the morning, we watched 'em depart singly and by squads for the day's sport. But we dared not dilly-dally. There was dinner to get.

The day was one long revel of culinary

WE FELL EXHAUSTED JUST BEFORE TIME TO GET BREAKFAST.

activity. Hunters came and went, pausing in passing to eat. Ivison shot an antelope at ten-thirty, and Armitage came in, about three in the afternoon, with a maudlin tale of having tracked a bear four miles or so, which finally turned out to be a timber wolf.

Then, toward evening, Doc claimed to have crossed the spoor of the big cat they were all in search of, but had lost it in a cañon

Harry Higgins and Clancy forsook forest and field to spend a day angling. They came in (quite a while before dark) bearing half a cartload of fish slung on a pole between them.

I helped get supper somewhat morosely, a prey to a sullen and righteous ire. 'Twas an imposition, that's what it was Our guests ate, smoked, and played high-five till late. I thought I'd get a chance to set some night-lines surely but I didn't. We had to clean fish for breakfast. I fell asleep without the aid of an opiate. Nothing like the tang of the woods to—but no matter

I was awakened by a prodigious bustle and stir about me. Armed men and unarmed dogs cavorted in the light of the camp-fire. A hoarse murmur of excited voices was mingled with canine yelps. I thought I heard a sound as if some one was groaning.

And then, from somewhere along the lake shore, there rose a weird, quavering, staccato scream—a wild, shivering wail that trembled and died and reechoed frightfully.

"Gadzooks!" said I. "What 'tis, is it?"

"Panther," whispered Honk fearsomely "Chitwood got a good look at it. It was here in camp. It was the blaze-faced lion they're after. That's Chitwood groaning—"

"D-did it b-b-bite him?" I asked nonchalantly.

"No; he fell over a dog and sprained his ankle."

I've seen men more or less battered up and contused, from time to time, railroading. I've even seen 'em ravished of fingers or toes, not to mention legs or arms. But I never saw one make the fuss that Clancy made over his sprained ankle. You'd have thought his was the first sprained ankle in history. To our already manifold duties of cooking and camp-keeping was added the thankless task of nursing that big baby.

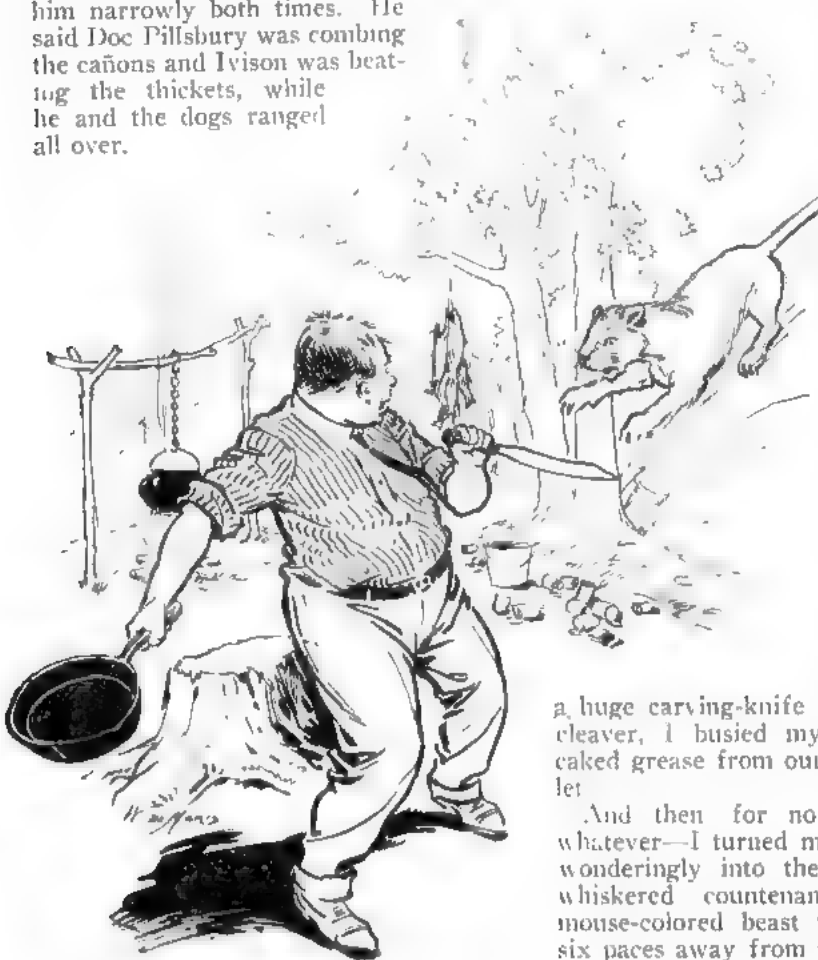
All the rest went after the panther at dawn, and we found that we either had

to bathe Clancy's hoof in hot water or listen to his whining and moaning. I suggested pointedly that the place for him was at home—and offered to lend him a burro to ride thither—but he declared his intention of sticking it out

We got no chance to fish or hunt that day, which was Sunday, and the following Tuesday would be the end of our vacation.

Bah! 'Twas too much! In fact, I didn't close my eys in sleep that night for thinking about it. It and the lion together. The next morning was Monday, and all that day the chase of the big cat was on.

Reports began to come in that he was being hard pushed. Armitage crashed through camp once, snatching a handful of grub, stating that he had shot at the panther twice, miss him narrowly both times. He said Doc Pillsbury was combing the cañons and Ivison was beating the thickets, while he and the dogs ranged all over.



I SWUNG MY SKILLET AND BRANDISHED MY KNIFE!

It was some hunt withal.

As the day wore on I fell to muttering maledictions to myself and growling in my throat as I juggled cookery or steeped the game leg of our invalid in hot lake water. I approached that stage of dark malignity when a man bursts into the full bloom of anarchy and insurrection.

I was getting sorer and sorer at my job. Honk must have noticed it finally, for he addressed me meekly, saying that it was too bad I'd lost out on fishing and everything. He said that the thing to do was to go then and there and fish for an hour or two, regardless of what happened. He said he'd look after camp in the meantime.

"Well, all right," I said dubiously, "I'll take my tackle down with you when you go after water. I'll come when I've cleaned up this mess of dirty pots and pans."

Honk set off at once, whistling. Clancy, for the time being, was quiet. Perhaps he slept.

The gentle hush of mid-afternoon hung over camp—a hush broken only by the buzz of inquisitive flies and a faint yap yapping that sounded like the baying of distant dogs. With a huge carving-knife that was almost a cleaver, I busied myself scraping the caked grease from our biggest iron skillet

And then for no apparent reason whatever—I turned my head and gazed wonderingly into the yellow-eyed, be-whiskered countenance of a large, mouse-colored beast that crouched not six paces away from me.

I marked the switching tail, the flat-

tened ears, the half-opened mouth, with its lips drawn up sneeringly. I noticed a splotch of white on the flat forehead.

Comprehension dawned! It was the blaze-faced panther. I gathered from his expression that he didn't like me.

"Scat!" I said angrily.

But the big cat made no move to depart. No! He snarled, quivered, squatted lower, and, without further quibble or argument, leaped lightly and airily straight at me.

In that instant I became suddenly galvanized with an almost supernatural activity, stood up with knife in one hand and skillet in the other; and, at the moment of impact, I sidestepped nimbly, and, with the frenzy of five days' accumulation of anger, swung my skillet, brandished my knife, and smote and stabbed with might and main!

And in that dizzy instant my twenty or thirty or so years of life, with its checkered sequence of sun and shadow, of joy and toil and trouble, zipped through my brain like a ticker-tape.

I recalled stealing watermelons, my first chew of tobacco, Grover Cleveland, the war with Spain, Pike's Peak, and many other things.

And then the lion, on whose coco had descended that mighty skillet stroke, crumpled and dropped like a sack of wet sand, with my knife sticking between his ribs. His blood spurted forth and spattered the ground.

Maybe I did lose a little of my *sang froid* after that. I admit to a certain degree of haste in my movements. It's barely possible that I did call out Honk's name as a necessary means of attracting his attention.

But when any one says that I rushed shrieking through the woods, battering my head against trees and tearing my pants on thorn-bushes, in a wild delirium of excitement, I must brand the allegation as a base and malicious calumny.

Honk bobbed up from under the bank of the lake finally. He held my trout-rod in his hand. A freshly caught sun-perch dangled from the hook. I had barely breath enough left to point my finger toward camp. He beat me back—but then he was fresh and I was winded

From out of the thickets came Nimrods and dogs. Even Clancy hobbled out of the tent. The puma lay stone dead where he had fallen when I swatted him. I stalked somberly forward and stirred the carcass with the toe of my shoe. The others crowded round with many "ums" and "ahs," rubbering and marveling.

I threw out my chest. Messrs. Dewey and Hobson had nothing on me.

"Well, some of you get busy and take off this pelt," I directed. "And the rest of you can start supper. You may call me when everything is ready, please."

SOLVING ALASKA'S RAILROAD RIDDLE.

ALASKA, with perhaps the largest hard coal deposit in the world, shivers helplessly through the arctic winters because she has no means to mine and transport her fuel. This has been the great drawback to the country's development There are vast agricultural and grazing tracts, and the summers, though short, are favorable to certain crops; but people are not willing to endure the hardships of the intense cold with inadequate fuel supplies, hence the population continues sparse

This cry for coal was so insistent, and the stories of corporation grabs of mines so irritating to public sentiment that more than a year ago President Taft sent Secretary of the Interior Fisher to investigate conditions. On his return he recommended that a commission be appointed who would examine into the transportation question in Alaska, for Fisher recognized that a railroad to carry the coal to the coast towns was the primal necessity. Mining companies would labor in vain if there was no way to ship their output to the consumers, except by dog-trains. This commission has made its report, and the President has laid it before Congress for discussion and action.

Unqualifiedly the commission has recommended the construction of two railroads which shall connect the coast towns on the Pacific with the two great inland waterways, the Yukon and Kuskokwin rivers. These roads must either be built by the government and leased, with stringently cheap transportation rates, or they must be built and operated by the government.

Observations of a Country Station-Agent.

BY J. E. SMITH.

No. 63.—If the Casual Traveler Would Only Observe these Simple but Important Rules He Would Temper the Troubled Life of the Station-Agent.

HEN traveling one should observe a few simple rules. For instance, during a conversation while the train is running, the voice is pitched high and strident to carry above the noise of the moving train. Should the train come to a sudden stop, lower your voice at once or you will bellow like an auctioneer.

All the passengers will be startled and will stretch their necks and look at you in wonder at such an outburst of feeling over some stupid and commonplace observation.

You may be talking loud and earnestly over some trivial thing, the roar of the train suddenly ceases, but you keep right on to the end of your sentence and exclaim: "That wart on the end of her nose finally went away."

A dead silence, then a general titter goes around. All the passengers look at you. They think you are going to shoot again, but you don't. You get red in the face and slide down in your seat and whisper the rest of it.

There is no conversation quite so loud as the conversation in a closed passenger-car just as a train comes to a sudden stop. Nothing sounds quite so foolish as some light remark on some immaterial subject, bawled out in vehemence and high pressure in the midst of a dead silence.

Always remember: When you feel the air applied, immediately put the soft pedal on your talk.

Another thing to remember is this: When passing through the small towns, do not look at the riffraff assembled on the platform. Stretch your neck to read the sign on the depot end or side that tells the name of the station.

In that way you will be taken for a through passenger from afar to afar, and not a near-by product of the corn belt or the dairy district.

Through passengers always look up to the station sign-board to see the name of the town. Local travelers know the town and always squint down on the waiting populace.

You can be whichever you prefer by a simple twist of the neck.

Perhaps it is needless to say that it is always bad form to thrust your head out of the car window at all stops in the effort to see everything. High strung curiosity is never good form, and for every lolling noodle and roving eye there is a little cinder. One hot, little, sharp-edged cinder will spoil all the scenery and human interest over the whole division of any railroad.

Keep your head in; but if still captivated by the marvels of travel, open your window as high at it will go. This puts you nearer the passing panorama.

The movement of the train will blow

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the smoke and grit over the passenger in the seat behind you. Never mind that. You had nothing to do with him occupying that particular seat.

If some inconsiderate passenger opens the window just ahead of you, tell him to close it, or, better still, complain to the porter or brakeman.

Further advice might be given on inclining postures that enable one passenger to occupy an entire seat while the aisle is full of standing passengers, but most of us know so much about this that it will not be necessary to publish my charts, diagrams, and blue-prints.

When ordering a berth always indicate to the ticket man that you must have "lower center."

If the ticket man mentions Nos. 1 or 2 and 11 or 12, protest vigorously that you will not have your rest disturbed by the noise of the wheels. There may be no sound basis for your objections, but it serves to show that you know where the car-wheels are located and that you are a discriminating passenger.

If all the lowers are taken, object strenuously to an upper. An upper is just as well, and there are some experienced travelers who prefer uppers for their lullaby qualities and because they are twenty per cent cheaper than the lowers. That is the humiliation of it. What traveler on a Pullman wants to be twenty per cent cheaper? Think of the abasement, the mortification, and the degradation!

Inventive genius is now planning the ideal sleeper. It is made up entirely of centers and lowers. There are to be no ends and no uppers. It is being perfected by the same fellow that invented perpetual motion.

In ordering a berth, be particular to indicate not only a lower center, but emphasize that it must be on the shady side of the sleeper. This shows still finer discrimination.

The ticket-agent will reply that he would be delighted to insure you the shady side, but that he has no assurance that the car will not be turned.

How provoking it would be to start shady and then have the car turned end for end out in the yards before you leave the city, or at the first terminal point, and thus leave you in the sun all the rest of the trip. The wise ticket man cannot assure you. He will do the best he can. This is sufficient for the passenger and an easy way out for the ticket man. It gives him a wider range of berths to choose from.

In a general way, all of us have the impression that it is only people who have wealth and are blue of blood that travel in parlor and sleeping-cars. We are wrong. It is only a token of seclusiveness and a mark of gentility.

The sleeper is not entirely for those who can afford it, but for many whose purse-strings are slender enough, but who delight in the class and appearance it imparts to their journey. Often these are the passengers who most tickle the palm of the porter.

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IT was not long ago that there came to our station two young lady school-teachers on a vacation trip to Washington, District of Columbia. All the money they had was earned as grade teachers, and it is never sufficient to turn one's head, to say the least.

The two young ladies debated long and seriously whether to engage a state-room or a section. They wanted all the pomp and flourish to be had. They finally came down to two opposite lowers. They descended reluctantly and by degrees, and then only when actuated by the hard necessities of conserving their slender resources. Such are the prodigal plutocrats of travel.

Old Uncle Uriah Bunger and his wife came in from the country and took the same train for Hanover, Pennsylvania.

Uriah at once decided on two second-class tickets, the second-class fare being two dollars less than first class

"You do not want a sleeper then?" I suggested.

"Nope," grunted Uncle Uriah.

"A sleeper," repeated his wife. "Do you reckon we could go to bed in that car with all them people?"

I explained to her that there was nothing to mortify or annoy her in the process of turning in for a night's rest on a Pullman.

Uriah spoke up.

"But you say we can't get a sleeper on a second-class ticket"

"Not second-class," I replied. "Your tickets would have to be first class."

"But they cost two dollars more. That's four dollars for us two, and a sleeper would be still more. They ain't throwed in, are they?"

"They'd cost a quarter more anyway, wouldn't they?" asked the woman somewhat sharply.

"Five dollars extra."

The woman was dumfounded over the prospect of indulging in such regal extravagance.

"Why, Uriah!" she exclaimed. "That would cost us nine dollars more than we calculated on. That would be thirty-six pounds of butter, forty-five dozen eggs, twenty bushels of corn, or thirty bushels of oats just to lay down on a blanket. I wouldn't sleep a wink!"

Having had this stupendous extravagance reduced to terms of farm products, Uriah, seizing the full import of it, at once closed all prospects by ordering two second-class tickets.

"Land sakes, but people must be hard up for sleep to pay that much for it," mused Mrs. Bunger

Uriah added that "it didn't hurt nobody to go one night without sleep." Mrs. Bunger testified that she had at times "set up a whole week at a stretch with hardly an hour's rest," so it was mutually agreed that one night's wakefulness was not a matter of any particular consideration, and they proceeded on their way "second class"

Before going, however, Uncle Uriah passed this bit of information to the ticket man:

"I used to travel a good deal cheaper than this fifteen or twenty years ago"

"How did you turn that trick?" asked the ticket man.

"I used to go to Cincinnati or Chicago and back for twenty cents."

Uriah gave an exultant chuckle and watched with triumphant glance the ticket man grasp the full dimensions of such an achievement.

"You can't do that now," bantered the ticket man.

"Railroads ain't as friendly as they was, that's a fact," observed Uriah. "I used to buy hogs in them days and they let me ride on the freight-train with 'em."

"In the same car?" asked the ticket man in pretended astonishment.

"Oh, no. I always rode in the caboose with the conductor. When I'd get to Chicago or Cincinnati and sell my hogs they'd always give me a pass back home, good on the passenger-train."

"But why should that cost you twenty cents?" asked the ticket man with reviving interest.

"Why, I'd have to stay around about a day at the stock-yards waiting for the hogs to be sold, so I'd buy a dime's worth of crackers and a dime's worth of bologna."

"Seems to me," observed the ticket man, "you could have saved that money by taking a lunch with you."

"I tried that two times. Do you know it disappeared both times before I got in? Do you know I always thought the trainmen knew where it went? Anyway, I was always glad to get some good bologna."

When the train pulled up the ticket man had a parting glimpse of Uncle Uriah and wife in the forward day-coach, stiff and upright, but nine dollars to the good.

At the same time the two sprightly schoolmarms were being conducted to their places reserved in the Pullman. A dusky-hued porter was attending them. They looked like a couple of princesses traveling in state.

Now, here is the point.

Uncle Uriah, grim, thrifty, self-sacrificing, could have bought the whole train, engine, mail-car, day-coach, Pullmans, and all, and he would have had enough left from his worldly store that would far and away exceed any dream of opulence ever entertained by the two schoolmarms.

Uriah owns over a thousand acres of our best soil, but he is of the stern, calculating stuff that would sit up night after night until exhausted to save five dollars per night. That is why he can buy and pay for the whole travel outfit. That is why he has one thousand acres of the best.

Most of us are spenders only. We flash and foozle all along the great highway to the shriveled exit. Uncle Uriah is of the order that saves all and lives and dies poor.

All of this is here set down to indicate that neither the Pullman nor the forward day-coach, the green or the yellow ticket, is sufficient as a basis of

estimation of the wealth or affluence of the occupant or the holder thereof.

Symptoms do not count.

I SOLD a ticket at one time to a man worth one million dollars. The fare was in odd cents. In the return change I found it necessary to give him two pennies. There weren't two pennies in the till. I explored the contents of my pockets and searched the safe for the two vagrant pennies, but the office was as penniless as Mother Hubbard's cupboard

The millionaire waited patiently for me to dig up.

"I declare," I exclaimed with some flustration, "I haven't a penny. Not one single copper in the house"

Now, as a charter member of the Independent Order of Spenders, I know exactly what answer I would have made to that remark. I would have come back airily and agreeably like this

"Well, old chap, you will have to owe me. I'll get it the next time I go through." Or this: "Oh, well; never mind What's two cents? It won't make or break any one."

I would have walked away two cents out. I would never have given it another thought, nor would I ever have been any the worse for it.

Old Crœsus did not walk away. He did not get unnerved or excited. He just quietly waited. That is the most exasperating attitude any one can take. The very coolness and composure of his easy advantage irritated me.

"Well," I exclaimed, "I'll have to go out and get some pennies." I twisted that out with a very evident trace of petulance.

"Very well," he said calmly.

I slammed my hat on, strode out with energy, and got a supply of Indian heads

Old Money Bags never shifted a foot while I was gone, or did he welcome my return with a smile or evince any outward show of gratitude that he was to get all that belonged to him. He just slipped the two cents into his pocket with the remark:

"Seems to me you would keep yourself supplied with pennies."

I moralized a bit to this general effect. If I were old Uriah and had an estate of one thousand acres I would travel first class and I would ride in a Pullman and I would occupy a whole section at the very least. If I were a seven-figure "plute" I would not be so infernal particular about two copper pennies that I would compel any one to quit and go out and hunt them up for me.

When I think of vast riches I always expand with toleration and charity.

I have it! It just came to me! That pleasing amiability of mine, that ready complaisance in all things, that proneness to yield to the allurements of ease and pleasure keeps me in the class that forces me to join a suit club and pay in two dollars per week whenever I need a new suit

Here is a receipt to the road to wealth. Jot it down:

Sit straight up in the day-coach all night Always wait until the shifting menial goes out and runs down the two pennies that belong to you.

HAVING set every one right, let us now revert once more to the subject of "lower center."

A pudgy woman of fifty wise years rather surprised me by ordering the first forward berth. It was such an unusual request that I questioned her.

"Because it is the safest place in the car," she replied.

"And for that reason you want the first forward berth?"

"Exactly so."

I confessed to the lady that this was something new to us. Never before had I had such a request and for such a reason. I informed her that passengers who gave thought at all to the matter of personal safety invariably select the middle of the coach. That is why almost all requests for reservations are for "lower center."

I explained to her that if a wreck occurred, whether from collision or otherwise, the front of the coach suffered most from the impact, and was most likely to be shattered and telescoped. Same applied to the other end of the car in the event of a rear-end collision.

It was for these reasons I made it quite plain that the center was universally chosen as the safest spot in the

coach. I informed her she was the first passenger that had ever made a request for the first forward berth on the presumption of safety.

The woman was rather decided in her opinion and replied somewhat tartly:

"That is because people do not know anything about the dangers of travel. The forward front seat is the safest place in the car."

She gave me the "argument closed" glance which is the sign of womankind that, having stated it, there was nothing more to add. To me it was a novel idea —one I had never before heard advanced. I confessed to her that she had my curiosity aroused

"That's it," she replied. "Here you are in the ticket business and do not know. I have always contended that people do not reason. They are too much like children. When they are about to travel they make mental pictures and conjure up scenes of wrecks and they think that a collision is the only danger of travel.

"Goodness me! Such ignorance! Do you know that there is not one passenger in one million that ever receives so much as a scratch? It is just as safe to travel from New York to St. Paul as it is to walk three squares in the busy part of any large city. You can go from Boston to San Francisco and return with less danger of bodily injury than to take a twenty-mile spin in an auto. That may sound funny to you, but I am sure it is true.

"Young man, I will tell you the real dangers of travel. It is being confined in a coach a whole day or so with from ten to sixty people of all classes and in all conditions of health. If I have the front seat the air currents are all the time back of me. I am not inhaling tuberculosis, pneumonia, grippe, and common bad colds from a lot of unknowns in front of me."

"But you get the draft from the door," I interrupted.

"Not particularly noticeable in vestibuled cars; and, besides, the air from the outside is not inoculated. But after it has passed along the aisle for a few seats and picked up a mongrel assortment of parasites, I think I would rather avoid it. Lower center is welcome to it, so far as I am concerned."

Lower 1 was reserved for the lady. She will never have any trouble in securing what she wants in a Pullman if there is any room at all. All the other travelers want lower center.

"Did you ever stop to think, or do you recall," she added, "how often you have read or have known of some one returning from a journey and being ill from some disease contracted on the trip? There are no statistics, I know, but travel kills more people ten times over than all the wrecks and smash-ups."

Perhaps the woman is right. There are no figures. All who are inclined to believe her will find it easy enough to have the forward lower reserved.

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SO far as personal violence and danger are concerned, the common passenger-coach is about the safest place in the world. Every railroad has its string of obsolete passenger-coaches. They have their cycles of age and usefulness the same as an individual.

Time was when they were bright and new and the road was proud of them. They made up the best trains. After a while they found their way to less important divisions, then to work trains for our foreign railroad laborer or for the bridge or carpenter gang.

Not many of them have ever met a mishap of any kind. Day after day and year after year in their daily turn up and down the road they have carried passengers by thousands and never marked one with a scar.

Old Dobbin, the twenty-year, faithful, family horse has no such record.

Nevertheless, through all the railroad service people have the scent of danger. Among those who do not know, any railroad position is considered an extra hazardous occupation.

The changed conditions — air, patent couplers, and other modern devices are not taken into consideration. For another decade, perhaps, people will continue to think of links and pins, deadwoods and the toll of life and limb attending them.

The impression still prevails that a brakeman takes his life in his hands every minute of the day when he is on duty, and that but few of them emerge

with all their fingers, toes, and other component parts.

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A VERY stout-looking young man of about twenty-seven years stood at our counter the other day asking if there was any job in the railroad warehouse open to him.

There was nothing in that line at our station for him, but I reminded him that the road was just then needing both firemen and brakemen, and from his physical outlines I thought he could be placed.

The suggestion seemed to strike consternation

"Why," he said with a shudder, "I wouldn't go braking for the whole road."

"Why not?" I asked.

"Because it's too dangerous."

I attempted to assure him there was not much danger any more—no more, in fact, than in hundreds of other occupations.

"None of it in mine," he said.

Faint hearts are common and cause no surprise. Still something led me to ask the young man where he had been previously employed.

"I've been working for the Ætna Company for the last five years, down in the Indiana oil-fields. The field is fizzling out and nothing more doin'. Thought I'd try and get something else to do, but I don't take no chances on a brakeman's job, not me."

"What were you doing in the oil-fields? Drilling or building derricks?"

"Nope—that's too tame. I handled the explosives. We had to shoot the wells, you know. That's what I done. I drove the dynamite wagon. I handled the stuff for five years."

Drove a dynamite wagon five years and would not take a job on a railroad on account of the danger! Can you beat that? I never heard of but one incident that was in the same class.

One day a structural steel worker was handling rivets on a beam poised some twenty stories above the walk. As he stood erect on the beam it raised the hair on the heads of the people below who were watching him and were shuddering to think there was nothing but a slender beam between him and a two-hundred foot crash.

The structural worker stood up because his attention was attracted by the vision of an air-ship circling over the center of the city.

The man stood on the beam and watched the maneuvers of the aviator in the air-ship. Finally he resumed work with this remark:

"By George, that guy's got nerve!"

So it is everywhere and all the time. Statistics show it is safer to be a passenger in a first-class coach on a good railroad than to remain in your own home.

And the young man who brakes or fires under present-day regulations is safer than feeding a corn-shredder, driving a delivery-wagon, working in a factory, or many other occupations that young men are ready to scramble for at half the pay.

Do not be afraid of the railroad. As for the microbes that gather in the coaches and hop jubilantly down the aisle all the way from lower 1 to 11, they are the same breed and virulence as those that meet the predisposed victim at every street corner, department-store, or public gathering. You cannot escape them, whether in a railroad coach or at prayers.

INVENTOR OF INTERLOCKING DIES.

JOHN SAXEBY, inventor of interlocking switches and signals, died last April at Hassocks, near Hayward's Heath, England, at the age of ninety-one. He was born at Brighton in very humble circumstances. For over twenty-two years he worked for the Brighton Railway, and brought out a signaling lamp which gave twice the light of those in use. For this the company gave him £50. Fame and a fortune of £200,000 came to him through his invention of interlocking railway switches and signals. Prior to this invention many accidents were due to the changing of switches while a train was passing over them, but with Mr. Saxeby's invention there came into existence a mechanical reciprocating communication and action between switches and signals. The first signal of the type was erected at Keymer Junction, near Hayward's Heath. Mr. Saxeby started in business, and as railways rapidly recognized the value of his invention, he ultimately employed many men.

For the Benefit of Kelley.

The Vauclains and Link-and-Pin Baseball Teams Play a Startling Game to Help a Hero of the Back Shop.

BY HORACE H. HERR.

Author of "The Carbon Copy," "Tracer 1313," etc.

JUST how I happened to be switched out from the quiet pursuit of health, happiness, and my pay-check, and shoved right into a cut of trouble with two ball-teams on the head end and a caboose-load of angry spectators, is more than I've been able to figure out to my own satisfaction.

I've been so busy piloting a planing tool for the past ten years I've had no time to pop off about my knowledge of ball-tossing, and I know I didn't put anything in my application-blank to indicate that any one had ever told me that I knew the difference between a four-inch nut and an in-shoot.

Back in the days of the town-lot pastime, when we all played "one ol' cat," the other fellows used to do the pitching and batting and I was just the cat.

Even then I never learned how to keep my thumbs in the clear, and half the time I'd try to catch the ball with my mouth, though I'd been told a dozen times that, besides being against the rules, it was hard on the teeth.

Then why did Jimmy Snyder pick me, knowing that every time the umpire yells three balls I have no more sense than to start searching myself for a pawn-ticket?

Jimmy, who's the acting stepfather to the pipe-dies and drills in the tool room, drifted into the back shop that morning carrying a pound of cotton waste and a baseball bat. He didn't give me so much as a 19 order to indicate that there might be soft track in the vicinity of Sheehan's pasture or that I was due to hit a casting that would turn the point on the best planing tool in the shop.

He whistled off and began a lecture on how the boys of Cambridge wanted to do something handsome by Kelley, who had got his foot in it, so to speak, when the big crane in the foundry went wrong and spilled a couple of tons of molten iron on the floor.

Kelley didn't have no more sense than to try to wade the iron fire and pick up Martin's kid who was perched on a molding-frame playing Robinson Crusoe or some other game that don't take more than one kid to play.

Kelley got the boy, all right, but he certainly ruined a four-dollar pair of hob-nails, made his denim pants look like a bathing-suit in disguise, and incidentally scorched both his feet so that for a time it looked as if he was going to lose his underpinning.

Though I didn't see the whole show, I did get to the foundry door in time to see Kelley shove the kid into the clear through the window, being kinda careless like as to how or where he lit outside the danger zone. I was one of the fellows who did the derrick stunt and carried Kelley over to the company doctor's office to see if he could turn up the bad wheels or if he'd have to crib the boss molder with a pair of cork legs.

That was along in the winter, and although there was every reason to believe that Kelley in time would be all right for road service, he was still in the back shop when Jimmy Snyder shoved

in on my track with that shipment of baseball language.

Even when a fellow is on speaking terms with an insurance company and drawing half-time from the shop, there's more than one reason why he isn't going to get mad if some one unloads a shipment of one-dollar bills in his pocketbook when he's more or less down and considerably out.

For that reason I signed the call-book, so to speak, without investigating as to whether the train was coal or stock.

"The Vauclain Compounds are a goin' to play the Link an' Pins a exhibition game of baseball on the Fourth of July, Pap," says Jimmy, swinging the new bat like a navvy would a sledge in a spike-driving contest. "It's fer the benefit of Kelley, and seein' how you're a married man and tolerably respected in this community, we have thrust a honor on you, an' I'm now a askin' you on behalf of the two teams to be the empire of the combat."

"Empire," says I, "what kind of a railroadin' job is that? If it's any kind of lathe or plane work, I'm the very man who— "

"That's the point," interrupted Jimmy, "seein' as how you've had a lot of experience, we knew you'd be able to see 'em when they shaved the pan and cut the corners, and 'course you'll know when the biscuit is served down the groove or when the pellet goes foul."

I sure hated to do it, but just had to shift the belt to a slower gear, for I didn't know for sure whether Jimmy was wanting me to take a job as a cook in the eating house, a pill-roller in a drug-store, or yardmaster for a hen-house.

"But this empire business," I interrupted. "As I understand it, a empire is a country where they don't have Republican and Democratic parties."

"Naw," says Jimmy, in a way that made me feel mighty cheap over my knowledge of geography. "A empire is the fellow who sees that the home team wins and gives the crowd a run fer their money. He's got to be a fair man what won't change his decision for a pop bottle.

"Seein' as how there ain't been nobody able to change your mind in an argument, we've agreed that you're a likely person to fill the bill. You a workin' right here in the shops, Pap, don't want to foget that the Vauclain Compounds is the shop team, and, of course, there may be a better bunch of ball-tossers made up of brakemen and switchmen, but they ain't been discovered yet."

That is every word of warning I had until the night of July third, and then it was plumb too late. Of course, right at the last minute I might have slipped the air into the big hole, but like as not I'd got every lung in the string and balled up the exhibition. When a train is down on the time-card it's got a moral duty to run according to the advertised schedule.

The first glimpse I got of the red light was when I went down to the post-office late the night before the game and found that Slim Dugan and Dude Flickenger had had an argument over Ruth Smith.

Ruth had half the men on the board laying off every time there was a dance or a sociable. She had all the fellows who didn't have a regular matrimonial run in chain gang, and while there were several who had tried to grab her on a seniority argument, she was insisting on the "first in, first out" rule.

It seems that Slim Dugan, who was running extra on the west end, got the idea that if Dude would devote all his time to wrestling moguls from the roundhouse to the coal track and back again, he'd not only be a better hostler, but Ruth wouldn't see so much of him; the point being that Slim was trying to argue Ruth into a home of their own.

Dude had a set of bungalow blueprints which he wanted Ruth to "O. K.," and wasn't willing to surrender his running orders to Slim.

The argument started in the post-office, and besides a bloody nose and a dark complexioned lamp, the result was that Slim said he was a better ball-tosser than Dude ever dared to be, and Dude said he could pitch rings around Slim Dugan and all his relatives.

"I'll show you I'm a sport," says Slim, squinting up his one eye that wasn't the color of a chunk of coal, "I'll pitch that game to-morrow, and if I lose I'll shove in on a siding and give you the main line, and if you lose you'll back in on the house track where you belong

and stay there with your headlight covered until the bridal train goes by."

"Just like firing an oil-burner," says Dude. "If all I have to do is outpitch you in a ball game to-morrow afternoon, I'll buy me a marriage license to-morrow morning."

Of course, me being the innocent bystander, they had to call me in as a witness, and when the conditions had been repeated for my benefit, Slim made it a little stronger.

"Now," says Slim, pulling out a roll of bills that was entirely to big to be alone with any railroad man, "I'll bet you twenty-five dollars that you lose."

"No," says Dude, digging in his pocket for a wallet the size of a train-book, "I don't bet, but I've got twenty-five dollars that says I can win, and I'll put it up against your twenty-five, and the fifty will go in the purse for the benefit of Kelley."

With that they loaded me down with ten five-dollar bills and I pulled out for home feeling sure that, besides having fallen heir to a lot of money that didn't belong to me, I'd be lucky if I wasn't sitting on some of the powder when the fireworks went off the next day.

Knowing that, win or lose, Ruth Smith was bound to be a married woman before many moons, when I got down to Smith's house and found Ruth and Kelley, with his crutches, sitting on the front veranda, I thought the little girl should have fair warning that she wasn't more than twenty-four hours removed from a short call on a double-header.

I did my best to impress Ruth with the seriousness of the situation, but all she would do was laugh like a boomer switchman when you warn him about kicking a draw-bar in making a coupling.

Kelley, being a sensible and serious-minded molder, seemed to appreciate the situation; and while I thought he was a little too energetic, pounding on the veranda floor with one of his crutches, I thoroughly indorsed his sentiment which, if I understood it, was that matrimony and baseball shouldn't be mixed

I left Kelley to explain to Ruth that the ball game was anything but a laughing matter and went home to put the ten five-dollar bills under my pillow and sit up the rest of the night to see that no one broke in the house and robbed me.

The baseball special was ready to start exactly at three-thirty that afternoon and there was a classy lot of passengers on the observation-cars.

Everybody in Cambridge who could get his hooks on two bits or find a hole in the fence was right there to see me give the high-ball that would start the run. For half an hour Slim and Dude had been getting the bearings in their tossing arms worn down, and the Link and Pin team was following me about like a tender follows an engine, insisting that I call the game.

It was easy for me to see that unless some one got immediate action the crews were going to get some yard time, so I called Chucks Burdett, who was the captain of the Vauclain Compounds because he had a real baseball uniform, and told him it was time to take the blue flag off of his section.

"But Pete Buckley can't get here until they finish putting a new pair of wheels under that special car that was cut out of No. 8 this morning," Chucks protested. "Pete's going to play right field for us, and without him we've got but eight men."

"Go ahead slow," interrupted Monkey Mannin, who was taking care of the second lead for the Link and Pins. "You engine-combers never wanted to play the game nohow. Bet you kicked Buckley in the clear on purpose so you'd—"

"Can't you call an extra man for that run in right field?" I interrupted, seeing that some one would have to pull the pin on Mannin before he pumped into a real argument.

Just then Jimmy Snyder, wearing a pair of new overalls amputated at the knees, slips over and gives me a dig in the ribs.

"Pete's the best hitter we got, Pap," he says in a whisper. "The last time we played with a real league ball he sloughed the pill so hard we didn't get it back in time for the next game, two weeks later. Blame it to the injectors or the piston packin' or whatever you like, but don't say the engine's ready until Pete registers in."

By that time the spectators was yelling at me to pull the whistle. One or

two of the remarks that floated over my way led me to believe that there were some persons in that crowd who thought I didn't know my business. So I called Chucks over to the bench near the water-keg and insisted that it was time for all the hired hands to punch the time-clock

Slim Dugan and Dude Flickenger got into the argument. They came in without regular orders, and the first thing I knew we were not more than a car length from a head-on collision.

"You fellows are just stalling," says Slim.

"We don't need but half a team to put you in the clear," replied Dude.

"Any time you make me take in my tail-lights it'll be because the book of rules says that markers have been cut out," replied Slim. "If we're so easy, why don't you start something?"

"We'll run in Indian Ben until Pete shows up," suggested Chucks.

"Naw you don't!" screamed Slim, probably remembering that Indian Ben got paid real money for playing ball during the big carnival at the Albuquerque Fair. "We're willing to play with you car-whackers, nut-polishers, and engine-wipers, but we're drawing the line at Indians"

In the mean time the spectators was remarking as to how easy it would be to rob the box-office and hang the empire, and it looked to me as if the thing to do was start the game and pick up a man to fill out the crew when we made the first stop.

Chucks finally got mad and Dude Flickenger seemed to be in pusher service with him, for Dude kept edging Chucks on with a tonnage of temper until the captain of the Vauclain Compounds threw his new red cap on the ground and remarked in an emery-paper tone:

"Tell 'em to play ball, Pap. We can give 'em a trimmin' with eight men; but, remember, when Pete shows up, in he goes."

With that I yelled "All aboard!" and some guy in the scorchers asked me if I thought I was conductoring on a trolley-line or a hand-car.

The Link and Pin took first ins, and when two men had tried to hit the ball and couldn't I had to tell Dude Flickenger that he'd have to throw a slower ball or he'd spoil the game.

I knew the spectators were going to be awful sore if every fellow who got his ins went up to the base and tried as hard as he could to hit the ball and couldn't. Dude said that was part of the game, and he wouldn't even throw the ball straight after that. Then he got peevish because I would call strikes on the batter when the ball wouldn't even travel in a straight line

The third man to have his ins held his bat out and Dude hit it with one of them swift balls. It came back at Dude so fast that it was all he could do to get out of the way so it could hit me on the shins. Seeing as how I stopped the ball and not wanting the spectators to think that I didn't know what to do with it I grit my teeth, grabbed it, and made as pretty a "cross out" as I ever made in my life, rolling the ball between the runner and the base.

For a fellow who hadn't touched a baseball for twelve years it was some roll; and by the time Tubby Turner had waddled down to the ice-house and fished the ball out of the pond the runner was around to where he started, had his train put away, and was about ready to go over and order his supper at the eating-house.

As far as that goes, he could have had the grub on board if he had not hung around to discover the excitement over at my station.

It looked for a time as if I'd have to send in a call for the steam wrecker and an extra gang, and by the time some of the Vauclain Compounds had quieted down to where they were talking United States again, I gathered that the empire wasn't supposed to do any crossing out.

I was led to believe that if I wanted to live long enough to draw the time I already had in I wanted to make myself think that the baseball had the smallpox and that I hadn't been vaccinated.

Of course the Link and Pins wouldn't shove the runner back to the first station, so we had to let it go as one run, which made Dude so mad he slammed three balls at the next batter so hard that the kid couldn't have hit them with an end sill, let alone a common bat.

Barring a few little unpleasantnesses we got through the next trick in pretty

good shape, excepting that the Vauclain Compounds failed to get a man over the division, and during the second session not a man on either side got beyond the yard limits.

I could see that it was nip and tuck between Slim and Dude, and I wouldn't have bet so much as a washer on either of them. Dude wasn't wasting any steam in talk and Slim had eat half of a ten-cent plug before the third trick was over, and it was in the third that Pete Buckley's turn at bats came.

Pete not being present, the next fellow on the list came up. Slim tossed him one so easy that a child could have hit it over onto the next section, and, of course, Bill Powers, who lacks six feet of being a child, hit it so hard that it sounded like an explosion.

Just as soon as the crash came, and before I could say "fair ball," Slim turned to me and screamed, "Wait a minute!" as if he was passing a signal to an engineer who was in the act of starting his engine with the tallow-pot cleaning the ash-pan.

"That man's out for batting out of his turn," says Slim. "Buckley's name is down to bat ninth on the list"

With that Slim pulled out the Standard Book of Rules and goes to turning over the leaves like a school kid hunting a new word in a dictionary.

It took Slim quite a while to find the verse. Every other man on his team came out to help him hunt for it and all the Vauclain Compounds came out to see what verse he was hunting

It was there all right. Plain black and white, in type big enough to show it was quite a station, water-tank, coal-chute, and junction. Anyhow, it was more than a blind siding, and I couldn't pass it up.

There wasn't anything for me to do but tell Bill Powers he couldn't be allowed pay for running light clear around the ball park. Big Bill got pretty sore about that trip and for a time I thought he was going to call a general strike and start in to destroy property, but Chucks finally persuaded him that he couldn't make any money telling me what I didn't know about the Standard Book of Rules.

Finally, when we decided that we wouldn't call out the militia, Chucks wanted to know what about the next man at bat.

"Every man who steps to the plate before Pete Buckley bats or is declared out," says Slim, taking another town lot out of the southeast section of his plug, "is out according to the Standard Book of Rules."

Sunday-school started again right away, and before we were down to the golden text the spectators were climbing down from the scorchers and I felt as if it would be best for all concerned that we cut the rest of the lesson short, so I ruled that Pete Buckley had been at bat and had made an out, giving the in side two outs, so to speak.

Dude was still popping off when he got back to the bench and the third man went to bat with a clean record and the future before him. He made three swipes at the ball and came so near hitting it once that I shut my eyes.

An engine running wild on a crowded division would have had no more trouble keeping in the clear than I did; but the farther we went the more improvement I noticed in the road-bed.

At the end of the fifth inning I had the nerve to walk right up to the water-barrel in front of the grand stand and look it square in the face as I drank a tomato can of water.

Kelley was the first person I recognized. I knew him by his crutches. Ruth Smith was with him and they were in the first row.

I waved my hand, and Kelley yelled to me that I was doing all right. I could tell by Ruth's face that she was mighty interested in the ball game, and I couldn't help but wonder whether she wanted Slim to reach the register first or if Dude's trip-ticket was the one she wanted to be turned in.

Well, the two crews did noble work in the sixth and seventh innings, and the score-board, with the exception of the one run made on my cross out, looked like a flock of links going north for the summer. The seventh ended by me calling Pete Buckley out for the third time, though Pete wasn't even on the pasture and hadn't sent word as to when he expected to arrive.

The Link and Pins failed to tally in their half of the eighth spasm and the Vauclain Compounds went to bat as if

they were bucking eight feet of snow with a rotary ahead of three hogs.

Tubby Turner pulled the pin on one and let it drift down a lead between the first and second siding where no one was working the field. In spite of the tonnage he was carrying, being some five feet tall and maybe an inch more around the boiler, he steamed into the first station and made the stop without breaking the train in two.

Dude got himself hooked up on a short stroke and shoved one over the air line. It was traveling so fast that you couldn't have caught it with a pink wire even if it had had the general manager's signature on it. It went whizzing off on the bias and cornered the one tree that stood over in the left end of the yard. Before the automatic air got to working it had bounded through a hedge fence. I don't know how they got it back onto the right-of-way, for I was watching Tubby Turner.

He started for the terminal as if he was on short time to meet a pay-car, and just between telegraph stations on the way to the third register he run into a burned bridge and spilled himself all over the landscape.

For a time it looked as if he wasn't going to get a flag back in time to keep Dude from smashing into his caboose. It being on a straight piece of open track, Dude managed to get slowed down before the real collision added to the havoc, but by the time Dude had used the emergency wrecking outfit and got Tubby onto his running-gear again, by leaving more or less of himself hanging on the hedge fence, Tim Woodruff had got through to the ball and had passed it into the pasture again. The result was that Tubby didn't clear by the usual five minutes when he came over the high switch with the score that tied the game and Dude had to wait for more orders at the third stop.

Of course, Slim couldn't help but get excited, and the way he slammed the ball through for the rest of that session made me think that he must have a grudge at the fellow who was behind the bat wearing the dog muzzle.

Dude got twelve hours late on his orders and lost his rights after three fellows tried to slip him more time on a 19 order and didn't connect—and there we were, me and the two ball-teams and the grand stand, and you couldn't tell for sure who was doing the most rooting

When the Link and Pins went up for their last ins Freck Williams, who puts in his spare time calling engine-crews, came riding up on his bicycle as if he was making a trial run for a mail contract. He yelled that Pete Buckley was coming on the goat which was shoving a string of cars out to the ice-house for reicing.

Of course, Dude tried to stall the game until Pete could get there, seeing as how the Vauclains had played the whole game with only eight men, and Pete getting credit for making an out every time he didn't show up at bat

I knew the spectators were too excited to stand for any delay, though we could see the goat fogging down back of town, and while I didn't like to do it, I had to make Dude toss the ball. The first fellow tipped two over the grand stand, and I warned him if he did it the third time he'd be out for knocking the ball over the fence. After that he behaved himself and didn't hit it at all.

Slim picked out an easy one, stepped onto the main line, and got knocked onto first base. Dude seemed to get nervous after that and issued the next hitsman free transportation down to the first station.

Monkey Mannin got to the starting track just as the goat shoved in on the ice track, which was a few car lengths beyond right field. Mannin picked out the first ball and hit it wide open. A blind man could have seen that it was going to hit the ice-house, if it didn't go over, and that there wasn't a player within a train length of it.

The grand stand pulled the whistle-valve wide open. The two men on bases —Slim leading at an easy pace—started for the home plate. It looked as if all the fun was over but giving Kelley the gate receipts, which amounted to a peck of two-bit pieces.

But Pete Buckley was riding on the first car of the cut which the goat was shoving into the ice track. When he heard the crash he unloaded from the top, clear from the top of a "refr," and lit running, and I'm a goat if he didn't pick that baseball right off of the ice-

house wall with his bare hands, and me standing there with my mouth so wide open that it must have looked like an engine that had lost its front end.

The minute Pete found he had the ball he slammed it back to first base and, as they afterward explained to me, he made the first and only double play of the game, for the runner who had made first on free transportation had tried to beat his way home, which, of course, was abusing his privileges, having left the base before Pete caught the fly ball.

"You're out!" I says when I got my breath again, and then Dude called my attention to the deal at first base, and I changed my decision and yelled, "You're out twice! Three out! Side out!"

Well, for the next five minutes I was as popular as a ward heeler would be in Little Africa on election day with a wheelbarrow-load of two-dollar bills. There have been times when I was dissatisfied with my life, but even in such dark moments I didn't think I was half as bad as the Link and Pin team proved I was.

They claimed that Pete hadn't formally registered out, that he couldn't possibly be in the game, that his catching the ball was an accident, that I was as blind as a bat and couldn't see and none of my family could see, and that I had the intelligence of a kind of meat that is usually done up in links.

They also said that I was a crook and a thief, a robber and a bandit. For a while I was sure that the sheriff who was in the grand stand had just come out there to nab me on a fugitive warrant.

When the atmosphere cleared a little I put the blower on and got up enough steam to tell some of them what I thought. I opined that since Pete Buckley had made three outs in the game there couldn't be any doubt but that he had been in the game from the minute he made the first out, which was down on the train-sheet, and if he wasn't in the game then he hadn't made three outs and the Vauclain Compounds had another ins coming to them besides the one that was coming on the ninth to even up.

I guess that was some argument, for the Link and Pins went back to their places and the game continued.

But the Vauclains couldn't get a car around the "Y" with a pinch-bar and it was getting dark and I was rather tired of stopping all the language from the players and the grand stand, too, so I decided to send them home where they'd have something else to talk about and so they'd have time to get ready for the fireworks that were coming off right after supper in front of the station. In other words, I called the game after the ninth inning with the score tied. One more argument with every one concerned didn't matter much.

Kelley, being on crutches, kept his seat in the grand stand until the crowd was out. Ruth Smith kept her seat to keep Kelley company, and that's how Kelley and Ruth came up to the gate just as I was having my final argument with Slim Dugan and Dude Flickenger.

I was determined to clean up all that baseball business while I was on the grounds, and that's why I quit arguing with the two of them and turned right to Ruth who had caused it all

"Ruth," I says, trying to break the news gently, "this baseball game was to decide, as I told you last night, who you are going to marry. It's ended in a tie, and you'll do me a personal favor, seeing as how I was the empire and supposed to make the official ruling in the matter, if you'll settle this argument."

Ruth turned so red I felt sorry for her, but I knew it was best that the thing be settled, so I insisted.

"Don't be backward about it," I says. "It's your duty to end this controversy. Is it to be Slim or Dude?"

"But, Pap," says Ruth, edging up to me shylike, "I thought the game was for the benefit of Kelley."

"It was," says I.

"Well, that suits me," says she.

I looked at Slim and Slim looked at Dude and Dude looked at me and Ruth and Kelley looked at each other for a moment; then, by using my auxiliary tank, I got enough air to speak.

"High-ball!" I says to Slim and Dude as I started down the road. "We may be in the right yard, but we're on the wrong track."

Then the three of us pulled out for supper and the fireworks feeling guilty like—just as if we'd split a switch in broad daylight.

RAILROADING IN THE BOER WAR.

British Boomer Who Joined the Old Rails in South Africa Tells of His Troubles When Transporting Troops Through a Region Infested with an Enemy Not Made Up of Soldiers.

BY DON "Q."

WHEN the Boer War was at its height I enlisted at the agency of the Cape Government Railways in London for service in South Africa. A stormy voyage brought me to Cape Town under the shadow of the great Table Mountain. There I presented my credentials at the traffic manager's office, received my pay for the voyage out, and was given traveling authority and a passport for my journey to Naauwpoort, a depot five hundred miles up country, where I had been appointed as a shunter (switchman).

The train journey occupied four days, because, after crossing the Hex River Mountains, it was unsafe to travel at night, and at the first station reached after sundown the train was stabled until daylight the following morning.

My first experience in sunny South Africa was far from pleasant. Expecting a warm climate, I had equipped myself with the lightest underclothing, and on the voyage out, having lost what little cash I started with at the "Crown and Anchor" and "Banker," I sold both overcoat and rug.

Imagine my discomfort on arriving at Naauwpoort in the early morning to find the temperature some degrees below freezing point. Naauwpoort is five thousand feet above sea level

Having reported to the station master, I was directed to my future quarters in the railway barracks, where the only furniture was a wire stretcher. The mattress had been "pinched." It was the only one to be had, so I was obliged to make the best of it, with a couple of kaffir blankets of gorgeous hue which smelled horribly of petroleum. Verily it was no place for mother's fair-haired boy who had always been used to his comfortable bed at home.

I found railroad work in South Africa very different from that in Great Britain. The three-foot six gage; the center buffer with link and pin coupling, and the vacuum-brake on the goods vehicles (freight-cars), took a lot of getting used to.

On the day following my arrival I was ordered to report at the commandant's office, and was there sworn in as a private in the Town Guard and fitted out with uniform, rifle, and ammunition.

The duty of the Town Guard was, as its name implies, to guard the town. Members received $1.20 per day in addition to the wage received for civilian duties. My total wage was $2.64 a day.

The daily routine for a railroad man in the camp was from 7 A.M. till 2 P.M. shunting in the yard, and from 2 P.M. till 6 P.M. he was free. Then he prepared for blockhouse and outpost duty from sunset to sunrise. Men on late and night duty were exempt from military duties.

Waiting for a Pig's Attack.

The camp was never attacked during the time I was stationed there, but false alarms were frequent and often amusing.

One stormy night a guard of five men and a sergeant were doing outpost duty on the bank of a river. News had been

received that the enemy was in close proximity and was expected to attack the camp in the early morning. The vivid lightning playing on the fixed bayonet of the sentry made him a conspicuous target.

Having this in mind, I was a bit scared when I went on at midnight for my two hours. The camp was surrounded with barbed wire entanglements, and on the wires, at frequent intervals, were hung tin cans, so that any one prowling around would give audible notice of his approach.

On this particular night the high wind kept the tins rattling, and this with the lightning, the cold rain, and the knowledge that the enemy was close at hand, each man's nerves were pretty shaky

Challenges were frequent, and more than once the report of a rifle told that some sentry's imagination had got the better of him. Suddenly, from the "beat" adjoining mine, came the command, "Halt! Who goes there?" followed by three shots in rapid succession.

Out tumbled the guards from every post along the line. Every man was ready for the attack, but no attack was made. For some time the rattling of the tins continued, but no answer was received to repeated challenges. Presently there came a grunt from the darkness and we saw an emaciated pig. We took him in and named him "Porky."

On another occasion the camp was "turned out" by a shunter named Jimmy.

Jimmy had a dog, and for some reason or other he decided one evening to put it "out of mess." That's what caused the trouble.

Fired At on a Siding.

There was an enclosure about twenty feet square adjoining the barracks, and into this Jimmy enticed the victim for execution. With due respect for Jimmy's marksmanship, all the fellows around made for cover. I had retired from what I considered the danger zone and was viewing the scene from a window.

Jimmy placed a cartridge in the breech, took careful aim, and fired The bullet, instead of hitting the dog, knocked a lump of brick out of the wall a foot above my head. I dived for safety. Then came two more shots and a howl from the dog. It had stopped a bullet by accident and was only wounded. It cleared for the veldt.

Three shots happened to be the signal of alarm, so in a very few minutes bugles were sounding, the camp was in an uproar, and every man was making for his post all because Jimmy tried to shoot his dog. Jimmy was hauled before the commandant, who, not being a bad sort, accepted his plea of ignorance.

Engineer Foiled the Enemy.

After six months' duty as a shunter I was sent on the road as a guard (conductor). On the return journey of my first trip to learn the road I received my baptism of fire, if it can be so called. We had been in Stormberg, the scene of General Gatacre's reverse, and left on the return trip to Naauwpoort at eight o'clock in the evening. All was quiet until we reached Kromhoogte, a siding eleven miles from the town of Steynburg, when suddenly the Tommies in the blockhouses commenced firing, and from the opposite side of the track came the return fire of the enemy.

We had a light train of about ten wagons of coal, an empty bogie in which a couple of "ration carriers" were riding, and, behind the van, the assistant traffic manager's coach, in which that official was traveling.

In the van, which was not armored in any way, there were some empty cases, a box of butter, and two kegs of paint. On entering the zone of fire Ferguson, the guard in charge of the train, lay flat on the floor with a keg of paint at his head and another at his feet. I followed suit with a box of butter for protection

I guess it wouldn't have done much in the way of stopping a bullet if one had come my way.

Driver Arthur Leak was on the locomotive, and he just about broke the South African record for speed. The van danced about in such a manner that, as I lay on my back on the floor, I was speculating whether I would be shot or be smashed up when we left the track.

But our luck was in. We escaped capture and the train kept on the track. Arthur Leak told me afterward that

with the first shot he opened her up and crouched as low as he could in a corner of the cab, while his fireman got in the tender.

Our escape from being wrecked was probably due to the Boers arriving too late to put an obstruction on the track or pull out a rail, or else the fire from the blockhouse was too warm for them. The only damage we sustained was a few bullet-holes in the wagons and the jarring of the nerves of the train crew.

On a run from Cradock to Rosmead a command came dashing across the veldt making directly for our train. Our driver, Bob Candun, said things on the whistle, but whether the Boers understood is another matter. We did not wait to find out. Candun, however, was not so lucky. He was pulling a train of supplies from Cradock to Naauwpoort, and about ten miles out suddenly found himself in a perfect rain of bullets, which fairly riddled the cab and boiler casing.

Boers Capture an Engine.

Under such circumstances he had no alternative but to apply the brakes and put his hands up. The Boers came up, boarded the engine, compelled him at the point of a rifle to blow off the brakes and start the engine. Then they told him and his fireman to clear off, at the same time jumping off themselves. Candun, however, had taken the precaution to open the injector, and the engine only traveled a few miles on its own and then went dead.

While one party was dealing with the engineman another turned the guard out of his van and sent him off as hard as he could go for Baroda, the next station in the rear. Once out of range, he sat down and waited to see what would happen to his mates, who presently joined him, and the three made for the station.

An engine was sent out in search of the train, and found it had "failed for steam." I believe Driver Candun received some recognition for his thoughtful action, which prevented a big smash.

After the arrival of Lord Roberts in South Africa the blockhouse system was introduced for the purpose of protecting the line. The blockhouses were manned by about six men and a non-commissioned officer. Frequently, when the enemy was not within a hundred miles, some Tommy would get a scare and start firing. This would upset the nerves of the men in the blockhouses. As a result hundreds of rounds of ammunition would be wasted before they regained their equanimity.

Shot At by a "Tommy."

I once had a hair-raising experience through a Tommy's imagination running away with him. It had been reported that the country between Naauwpoort and Rosmead was clear of Boers and it was safe to run night trains over the section between those points.

I left Naauwpoort with "No. 31 Down" at about one o'clock in the morning. Arriving at Ludlow, about twenty miles out, we were given orders to "cross" an "Up Special" at Bangor, a crossing place at which there was no official on duty.

At this siding there was a blockhouse. It would appear that the sentry was dozing when we arrived, for when I went ahead to the points (switch) to open them for the opposing train to take the loop (siding) I was just inserting the key in the points-lock when there was the report of a rifle and a bullet came whizzing by my head too close to be pleasant.

I immediately covered my hand lamp and crawled on all fours back to the engine. More shots followed, and then, "Halt! Who goes there?" That chap evidently believed in firing first and challenging afterward.

I was not taking any more risks, so I continued to crawl to the engine. Assuring the driver that it was not Boers but a fat-headed militiaman, we played a tune on the engine-whistle sufficient to wake the dead.

Haughty Officer Resented Delay.

It had the effect of soothing the troubled minds of the blockhouse inmates, and soon a hail from the "noncom" in charge advised us that they were satisfied we were harmless.

Profuse apologies followed and a "tot" of rum for all hands squared things. But what I can't understand is,

how that Tommy expected a Boer to be such a silly jay as to prowl around a protected area with a lighted lamp in his fist.

The railroad men were always the best of chums with the soldiers—regulars and irregulars, Canadians, Australians, and Britishers—and as a rule we got on pretty well with the officers. But now and again one would meet with an "officah" who thought he owned the earth and that everybody who did not wear a British uniform was a "beastly, bally Boer—what?"

A chum of mine once had an amusing experience with such an officer. He was working a troop special and, on the arrival of a train at a siding where his train was booked to cross an opposing train, he started to go ahead to open the points.

On passing the officer's coach he was stopped by that individual, who wanted to know why they were stopping. On being informed, the officer was very much annoyed. Why had not his permission been asked before the crossing had been arranged? He would not be delayed in that manner!

Engineer Defied Military Order.

He told my chum to tell the driver to "start away immediately" without waiting for the other train to arrive

His orders were received with a broad grin by the guard, who replied that he had better give his instructions to the driver himself. The officer was greatly incensed at such impertinence from a railroad man and called for a sergeant to arrest the "low fellow." Together they went to the engine-driver who, when he heard what the row was about, told the officer that the only orders he would take would come from his guard, and in terms more forcible than polite remarked that it would be better for all concerned if some people would mind their own "gory" business and leave the working of trains to men who were blessed with sufficient brains to understand that two trains could not cross one another on a single track.

Ordered Against Another Train.

The officer returned to his coach and hid himself. On arriving at the depot he laid his complaint before the official in charge. On being told that if the trainmen had obeyed his orders he would either be a fit subject for the hospital or ready for planting, he went away. There is a case on record where an officer in charge of an armored train did order it into the section on which another train was approaching. A number of soldiers were killed in the smash.

Twelve years have passed since these incidents occurred. Boer and Briton now work side by side and all feeling is dead—except for that pride of race which is to be found in every nation.

753,310,049 TONS OF ANTHRACITE MINED IN 1912.

THE production of anthracite coal in Pennsylvania in 1912 was 753,310,049 long tons, valued at the mines at $177,767,054, an average price of $2 36 a ton, according to figures just compiled by Edward W. Parker, coal statistician of the United States Geological Survey. This is a smaller production than in 1911 by 5,461,439 tons; but the value is greater by $2,814,619. The smaller production in 1912 was due entirely to the suspension of mining operations. Except for this the year's output would probably have been a record breaker. The shortage created by the suspension is estimated at about 10,500,000 tons.

The new agreement reached with the miners provided for an advance of ten per cent on all wages over and above those established by the original strike commission and for the abolition of the sliding scale. To meet this advance and other expenses the operators advanced the prices of prepared sizes of coal two cents a ton, with the exception of chestnut coal, which had been advanced the previous year.

An interesting feature of Mr. Parker's statement is that there is at the present time a market for almost any grade of coal that will burn

The old culm banks themselves are contributing their share to the total production, and these unsightly monuments to former waste are rapidly disappearing.

A Dance with Lucile.

Brothner Had the Right of Way, but the Hogger's Cleverness Ran Him onto a Siding.

BY DONALD FRANCIS McGREW.

BEFORE Brothner butted in between Lucile and me, I would have staked him any time, even though he was an O. of R. C. man and me a boomer tallow. When that happened, though, he became a national calamity.

Though I hadn't said the word yet, I registered a kick; whereupon Miss Lucile — who was sunshine and sweetness and Irish blue eyes all in one—gave me to understand that I wasn't giving any 31 orders on her road as yet.

So there I was with my red head and a grouch. At first I thought I'd let an engine run over me and then drag my tattered remains under her window at night so she could see me cold and forlorn in the gray dawn with a poor little flower on my breast.

The world was too cruel for me, what with having to ruin my pentecostal muscles shoveling Ethiopian diamonds on the Y. R. and C., and getting my dreams scattered over the landscape besides. However, I decided I'd give that fellow a run for his money.

I did, too. Right off the bat Lucile found out I was in the game to stick. And so did he. But it wasn't any high-ball run. First it looked like I had the rail, then Mister Brothner had me sidetracked; and so it went until some time before the B. of L. F. dance, when, yours truly coming strong at the finish, Lucile promised she'd go with me.

Say! I did a clog right then. I couldn't help it. A dance with Lucile! And that Lord Fauntleroy Brothner out in the cold!

The thought made the sun look like a golden lamp to me. I never saw the spring flowers look so fresh. Even Brothner's face looked beautiful. Every time he'd pass me looking as gloomy as a clay-bank in a rain, I'd think that mug the most handsome piece of art I ever saw.

But did you ever see a boomer tallow have any luck long at a stretch? I never! Every time he gets to sniffin' them balmy spring breezes, times when he'd ought to be puttin' in a fire, the putty goes down and he wakes up to find his fire clinkered and trouble squatting like a heavy sack right on his left shoulder.

And the upshot of *my* dreamin' was that, on the night before the big dance, my hogger and I found ourselves on the 362 in the yards at Dinville switching out our own train for an extra west back to division headquarters. Worse still, Brothner was conductor.

"Don't cuss," Frank says. "It's only eleven, and only seventy-five miles to go. We ought to be in by morning."

"If the train-delayer don't let everything run around us, or we don't have to pick up every lone jack on the line, or meet three or four sections of the same train at the same place," I growled.

"Don't borrow trouble," Frank grinned, hossing her over as the head shack let us down on two. "We'll make it."

"H-m," I grouched mighty skeptical. "You're never in till you're in on the Y. R. and C." Then I hit the seat-box and watched for signals.

The yards were a big world of dark-

ness, broke here and there by darker splotches that proved to be cars when you bumped into them, while away down through those lanes of shadows were the lamps of the con and the hind man, appearing, disappearing, and waving like little fireflies.

Most of the time you couldn't see the head shack either, save a patch of his legs, maybe, where the yellow circle from the glim fell on them; so besides pumping the engine, cracking the blower now and then, and putting in light fires, I was kept pretty busy watching for him when they were working on the left-hand side.

I'd catch the signal and relay it to Frank with my left hand. He, facing me with his left hand on the throttle and his right on the air, would give her a little steam, shut off, give her a little steam again, and shut off; then, while I watched the gently waving light of the head shack and steadied Frank down, we'd roll through the darkness with nothing stirring the quiet save the sizz of the air-brake.

Then we'd hit; the tank would shake a little; some coal would rattle down against the chains; maybe my left shoulder would bump against the cab side

Following that, we'd either pull out and over onto No. 10 with what we had, or else we'd see the fireflies swinging us back to make a coupling far down the yards. In the last case, we'd generally back up, slow down at the signal, get a "wash-out"—then get a tremendous jar—and then, when we were looking for a "go ahead" signal, get a "slack ahead" instead.

This commenced to be the regular thing. Frank got all out of breath hossing that Johnson bar back and forth.

"By George!" he suddenly growled, "they're having a bunch of trouble making couplings to-night!"

"Yes," I grunted. "Forty minutes we've been here now. And that ain't all. We're shoving a lot of pig-iron gons down onto the hind end and getting a lot of empties near the engine."

"Maybe the empties are set-outs," Frank says.

"H-m!" I snorted "I'll bet not. He's shifting the heavy part of this train where it drags hardest."

"You're prejudiced," Frank grinned.

I didn't argue; but it looked that way to me. Being on the lookout for something from Brothner, I commenced to smell a rat.

He had a good excuse there, all right. The train was in two and three cuts on a dozen different tracks, sandwiched in between other cuts, all uncoupled. From one to a half-dozen switches were necessary on each of the tracks to get the cars we wanted

That takes time in the best of conditions. But it's easy for a man to bungle a coupling, especially in the dark. As time rolled on that rat got a most magnificent odor, and every five minutes I'd take out my watch and cuss Brothner from his toes to his head.

"Hang him," I fumed, cracking the blower for the tenth time. "This blowing will clinker this fire before we get started. Another thing, we'll have to take water again. That means a lay-up here for 88. And if she's showing green—"

"Don't borrow trouble," Frank interrupted.

"All right, I won't, then."

But I didn't keep my word. With a girl like Lucile waiting at the other end of the line, and you with a hunch that your pet rival is deliberately stalling on you, it's no cinch to look like a man with a cool drink in front of him. I felt as pleasant as a man plastered with prickly burrs, and at the end of two hours and a half I was ready to swallow Brothner, clothes and all.

"One more now!" the head shack panted as he ran by to head us out of three. "Then high-ball!"

"You don't say?" I yelled mighty sarcastic. "What have we got to get next?"

"Dead engine!" he yelled back from the pilot. "The 339."

A dead engine! "Say," I yelled, "is that car-grabber looking for a 'comp' from the trainmaster? He's got tonnage enough now for a mountain-climber!"

"That's what I think," Frank snapped—more than usually snappy for Frank, too.

He opened the throttle wider, while I got down and took out my grouch with a few scoopfuls of coal against the poor, inoffensive flue-sheet.

Right then, though, I got an idea. We backed down on the dead hog—the head shack on the right-hand side. When the shack coupled up I saw his light slip away to her hind end. The 339 was coupled onto the cut behind her. Immediately I dropped down from my gangway, got busy instanter with a loose fish-plate under the dead hog's pony-trucks, and was up just as Frank got the signal to go ahead.

"What was the matter?" Frank asked.

"Hoe dragging off the side hooks," I replied, getting busy with the coal-pick. And just then there was a rumble and a bump, and another bump, and Frank shut off.

"What's the matter?" he yelled to the head shack.

"The 339's on the ground that's all!"

She was. She was on the ground right, too. Though he came over and cussed a while, even Brothner couldn't invent any excuse to spend more time trying to put her back on; so, after ten minutes sledging to get us uncoupled, he had to wire the despatcher that the 339 was hopelessly derailed, and we backed over onto ten and the train.

"What's that you said about the hoe?" asked Frank then; but I was busy and didn't answer. Later, though, I saw him grin.

At last, when they had coupled up and tried the air, we pulled down to the end of the yards and took water. And, sure enough, as I lay with one leg over the crane, here come 88, showing green.

"Wow!" I yelled at Frank. "I wonder how many sections. Suppose we get anything on any of them?"

"I'll see," said he, getting down and heading toward the telegraph office.

He came back shaking his head. "There's four of them," he grunted. "Despatcher says stay here."

I shoved the crane up with a bang, climbed down, opened the door to keep her from howling her head off, and lay back on the seat-box trying to be content. But the thump-thump of the air-pump was maddening. I got to pulling for those sections like a fellow does for a horse he's bet his last sou on.

After a century or so the second man showed up. Two green eyes blinked at me from either side his headlight, on which I caught his number—675. He whistled signals; Frank answered. With the crew yelling, the engine roared past us like a comet in the night; then, interjected with swishes of air when the spaces between the cars passed us, the noise settled down to a clack-clack of the car-trucks.

When the caboose finally clattered by I turned and watched her tail-lights dwindle away and the sky and smoke going red above her as the tallow opened the door; then she swished round the curve and was gone. For a long while, though, you could see the flares against the sky when the tallow put in a heel.

"I only hope the next fellow's got a red stack and a white feather like he had," I said to Frank.

He didn't, though. He came dragging along like a lame duck, while the last one—well, I was commencing to think he'd struck a washout before he showed up. It was then three-twenty in the morning.

"Come on," I yelled as I cracked the blower, got down, and heaved in a heel. "Come on, and let us go! We can make Wicketts for 38 if we get right out."

As soon as fourth 88 groaned by we started out of the siding; but, happening to glance back, Frank suddenly shut off and bit clear through his cigar.

"What's up?" I wanted to know.

"They're giving me a washout from behind!" he said.

I leaned out of his gangway. There were two lights showing, one of them coming this way; now one of them circled in a back-up signal.

Frank threw her over and backed into the siding, while I stood there and bit chunks out of the atmosphere.

"What's the matter?" Frank demanded when Brothner came up.

"Why, I didn't want to take chances on having to flag in on 38 at Wicketts."

"If I'm willing to take them, you ought to be!" the hogger flung at him.

"We'll take no chances with this drag as long as I'm running the train," Brothner retorted.

Me? For a second I thought of getting down out of that gangway and disappearing like a catamount. But that would only cause more delay maybe, so I took it out on the coal lumps.

"I know the mucker's stalling now," I told Frank. "I know it. You watch and see. He don't want me to make that dance; figures we'll get tied up somewhere under the sixteen-hour law maybe, and I'll have to stay and watch the engine until the other crew gets here."

"Aw, I don't think he'd do that."

"He'd do anything," I retorted. "Our sixteen hours are up at three. Wherever we tie up, he can get deadheaded in on 37, and that's the last west, save 9, until 25. That'll be the best I can do, unless I take chances on this drag beating her in—which it won't. They won't flag 9 for no boomer tallow, and 25 ain't due at Sanders until one in the morning. By that time—gee!"

I shut my jaw thinking of Brothner dancing around with Lucile while I sat out in the jungles taking care of a hog.

"Never mind," Frank says then. "We'll give him a run for his money. Unless they run more extras, we've got only 87 behind us and nothing but the local and the dummy to meet. You boil the water and we'll beat him at his own game."

That stiffened my chin, so, when 38 went by and we started down the main, I commenced putting the black on the white to lay that peg up against the pin.

"I'll walk you in, you baby doll!" I swore as I placed one up against the flues.

But just then, looking up from the glare of the door, I saw the head shack coming down over the chains, his lantern bobbing in the crook of his arm. "We've got to head in at Union," he says to Frank. "Pick up ten gons."

"Where do they go—ahead?"

"No—he's going to put 'em next the caboose."

"Where they billed for?"

"Set-outs for Youngers."

"Then why don't he let us pick 'em up behind the engine?" Frank demanded.

"Don't know," shrugged the shack. "He's the big C, I guess."

He sure was. You can't tell a con how to switch his own train. Therefore we switched at Union and cussed, and pulled draw-bars, and cussed some more till daylight, and then went on to Youngers to set out what we'd got.

And that's the way it went right along. Generally a con will come over and outline his switches to the hogger before they come to the station, so they won't waste any moves. He didn't. He stayed behind and gave signals.

And every pick-up was an agony. Set-outs were nearly as bad. Seemed we switched half the train at every stop. He had the cars sandwiched into eleven different parts of the train. It was like unraveling a tangled ball of twine getting them out.

Pretty near everything we picked up seemed to need repairs, too—brake-chains and air-hoses and the like—and so, what with pulling the air on us when we tried to run to Hogan's Junction ahead of 87, and again when we tried to make Tookers against the local, and all the rest of the hossing and cussing and slam-banging around, we were still thirty miles from headquarters at noon, with two trains to meet and four more pick-ups to make.

I was all in. I had cussed myself out of breath. Sitting on the seat behind the head shack, with my right shoulder against his back, I leaned out the window, letting my hands dangle like limp rags from the wrists, and thought the proposition over.

With those four pick-ups and the two meets, it was a tie-up under the sixteen-hour law sure—probably about Dinville. Thirty seven was due there at 3.45 P.M. No. 9 never stopped there. Twenty-five's time at Dinville was 12.15 A.M. Twenty-six, passenger, was due there at 8.35. She'd be the first thing to bring a crew, for it was a cinch they'd not stop one of the 86's—the fast meat runs.

I was sure elected to watch that engine, and no chance to get in much before midnight. But I wasn't beat yet. If I could put her on the temporary retired list, maybe I'd get to go in, too; and I looked around at the old 462 to see what I could do.

This was not so easy. A hog breaks down of its own accord easy enough, but to "jim" one is another matter. Besides running the danger of Frank catching me and leaving traces the master mechanic could see, I had neither tools nor time to "jim" the guns, the air-pump, or the nozzles.

I'd have had to take off all the nuts on the air-pump cylinder, and that's a job; and, even if I'd had time and tools to break the lifting nozzles in the guns, the M. M. would sure know they never broke of their own accord. Likewise, breaking off a gage-cock had the same drawback. The broken-off neck would stick in the threads. My best chance was in "balling up" the fire.

Getting down, I opened the door and took a look at the fire under the scoop. She was in bad shape. All that switching and blowing up had done it no good. It lay nearly level with the door. There were gray patches here and there where she'd clinkered clear through. And two flues and several stay-bolts were leaking.

"That settles it," I decided. "I'll fix that fire so she'll have to be dead-headed in, and then I *know* I'll get to that dance. They won't make me watch a dead engine."

Full of new vim, and casting a grim eye back toward *Mr.* Brothner, I got down at the next stop and climbed back with Mr. Slice Bar

Frank was oiling. Into the fire I went with the bar — rippety bang and back again. I also let it slip a few times, knocking the honeycombs off the flue-sheet, and it landed precisely where the flues leaked the worst

Getting back, Frank asked me what was the matter. I told him I was knocking clinkers off the sheet; but I didn't tell him about the slips nor the raking I'd handed the fire.

Touch burning Western coal with iron, and, unless you can keep rolling, iron forms, and in a mighty short while you will have the finest accumulation of unshakable clinkers that ever drove a fire-cleaner crazy.

That's what happened on the 462. In a little while hardly a breath of air could get through them; her exhaust just whoozed through instead of cutting sharp and quick

Mr. Clancy was right at the rat-hole, looking under the scoop, apparently spending a good deal of time looking for dead spots and asking the head shack to kindly kick down some lumps to mix with the slack.

But the putty went down to 180, then to 170, and the 462 got a kink in her back and commenced hunching.

"What's the matter?" Frank asked.

"She's clinkered bad," I sighed. "I can't do any more with this slack."

"Better let me spell you a while," he says. "If we can keep her going, they might run us in over the sixteen-hour limit, you know."

One look, though, was enough for him.

We made Goode's, five miles away, and only got there "on the hook." We just barely dragged into the siding at 3.05 P.M. When we were in the clear, Frank got down and walked over to the depot.

"I'll wire in we've got a dead engine," he says. "And we'll all catch 37 and go in."

Me? Say, I turned on the blower, climbed up on his side, turned on the gun, and cocked my feet up like a broker that's just pulled off a deal. Already I could hear the orchestra playing; already feel the waxed floor under my feet; already see myself shoving some presumptuous gink away from Lucile's card while I filled it half full with my own name. I felt so good that when Brothner passed by to the depot I came near whistling a tune for him to keep in step with.

"Aw, don't do that, though," I says to myself. "I can afford to be generous now with the poor guy."

So I actually fell to pitying him and was just on the point of going to him and telling him how sorry I was for poor conductors that aren't blessed with a lucky red Irish head, when Frank stepped out of the depot looking blue, compassionate, and a little mirthful all at once.

"Now," he says, "don't throw anything at me—but you'll have to stay."

"What?" I yelled.

"Yes," he says. "I know it's tough; but don't look that way, or I can't help laughing."

"Get it out of your system," I growled. "Then tell me what's the matter."

"The roundhouse foreman says they've got no other engine just now. You must clean this fire and build a new one."

"Didn't you tell him the flues were leaking?" I roared.

"Certainly. But he says for you to

try, anyhow. Says to fill her full of water, clean the fire, and build a new one. He figures a new hot fire will close those flues enough to get her in There'll be a crew out on 26."

"I'll quit!" I yelled, seeing Brothner come out and make a playful "pass" at the hind man.

"No," says Frank. "You won't have any chance then. You've got to work to eat, you know, and you're only missing one dance."

Missing one dance! A lot he knew about it. What does an old married gink know about a situation like that, anyhow? I knew Lucile wouldn't stay away from that affair on my account. I also knew that Mr. Brothner would be very much there. And here I was with wood to gather and about five hundred cubic feet of solid clinkers to pull out of an eleven-foot fire-box with a fifteen-foot hook made of inch-and-a-half iron!

That wasn't all, either. I sat there thinking it over while the 462 filled up. I thought of it while 37 came in and pulled away with the crew and that devilish, grinning Brothner. I was still thinking of it when the loafers slouched away from the depot and left me there.

No, that wasn't all. First I had to get wood — just pick it up along the track, old ties, chunks, anything. Then rob the oil-houses for oiled waste. Then get the 462 hot before I commenced cleaning her. Then drop the dump-grate. Then dump the ash-pan.

Next I had to cut off by myself and move ahead so I could keep a space clear beneath the ash-pit for the clinkers to drop through. Then take up the shaker-bar and jam and pound till stars danced in front of my eyes punching those back clinkers through the hole. And then—but I quit thinking when I got to that slice-bar. I was too blamed tired to even want to *think* of that!

"Anyhow," I thought, "I'll take my own sweet time about it, if that's any consolation."

I got to pitying myself that I'd ever taken any joy in slamming Congo nuggets into a goat and putting the white above her dome for a soulless, money-grabbing corporation.

Fine-looking sight an engine was, anyway. I looked around at this one's cab; at the gage-cocks with the streaks of white showing sickly against the black boiler-head where the lime had settled; at the dusty coal in the slots between the shaker-levers; at the greasy old lubricator, the smutty steam-gage, and the grimy tin cab lights glinting there in the slanting sun rays — then closed my eyes.

I hated them all and I didn't want to move. I was so tired I could feel the tiredness run clear down my back and into my toes.

And then—well, then—I heard a rattle of wheels in the distance and the thud of horses' feet. I was too weary to look up at first; but finally I did and stared—and rubbed my eyes—and stared again. There was Lucile getting out of a rig!

No one could have fallen off a roof quicker than this tallow did getting down from that cab

"For the love of Mike!" I yelled. "Where'd you come from?"

"It's not where I've come from that's worrying me," she finally gasped, after a prolonged look at my face. "I was hoping that 37 was late. But now"—and she got the color of pink shell—"tell me where *you* came from?"

Well, I couldn't tell her all about it at first. My mouth wouldn't shape itself right for the grin that twisted it.

But I didn't care. I led her to a seat —I believe she forgot to thank the friend she'd been visiting and who broke down or something like that on the way in and I told her all about how I'd put in the last part of the day thinking how much I was going to miss that dance.

"Well," she said at the end, looking down at her toe, so I only caught a glimpse of one pink ear, "if you are going to miss it, I'll just stay and miss it with you."

Have you ever had an unexpected cool breeze hit you in the face on a sweltering hot day? *That's* the way I felt, and, say! I waded into that engine and knocked out those clinkers and fired her up again with something in me that made those hooks as light as feathers.

Afterward, all by ourselves in a little corner of a little restaurant, we had supper together. And I never tasted anything so good in all my life!

TESTING AN ENGINE'S SINEWS.

How Inspectors Brand Every Piece of Material that Goes Into an Engine. Growth of an Important Department Which Guards Public Safety.

BY ROBERT H. ROGERS.

THE working of the department presided over by the engineer of tests is probably the least understood of any in the general scheme of railway organization. It now plays a very important part in successful operation. By the larger roads it is considered indispensable.

When properly administered, it protects the company from imposition in the purchase of cars, locomotives, and supplies, and is no mean factor in assuring the safety of employees and the public alike.

There was at first determined opposition on the part of manufacturers and builders to the presence of any outsider about their plants, and those who first undertook the job of inspectors had a rough road to travel.

They had no defined authority as representatives of their company, and when conscientious, could only beg that poor jobs be corrected. Such a thing as holding up delivery of the car or locomotive, on their own responsibilty, until such had been done was an unheard of procedure.

In early days there was continual bickering over the inspector between the company and the builders. Coming before the Master Mechanics' Association at the following annual convention, it appealed to the motive-power management of several roads and quickly became an institution.

It is safe to say that there is not a car or locomotive order under way in this country to-day, that is, of any magnitude, which is not watched by the purchaser's inspector.

This beginning of inspection in connection with new equipment, and its acquiescence to by the builders, naturally brought about the inspection of material as well, and in particular, fire-box and boiler steel, stay-bolt iron, tubes, and other primary essentials.

In the present time the system has been extended to include everything purchased by the railroad company, even to the analyses of the soap used on passenger-cars.

As the idea grew and became adopted by one road after the other, it was at first characterized by great confusion and the utter absence of system. The locomotive inspector usually reported directly to the superintendent of motive-power; the car inspector to the master car-builder, and the material inspectors to the mechanical engineer.

Up to the Chemist.

It remained for the Pennsylvania Railroad, some twenty-five years ago, to first concentrate the reports of all these men in one common office, known as the test department. An engineer of tests was appointed, a new office, as was also a chemist, and a suitable building was provided at Altoona, Pennsylvania.

The engineer of tests received the communications from all material inspectors and, where an analysis was

necessary, referred the same to the chemist. Under this arrangement it became possible to return a favorable or unfavorable report on a specimen submitted by the inspector at the mill within a few days, or, at the most, within a week or so, and with the saving of a great deal of time.

The Baltimore and Ohio Railroad was quick to fall in line in the establishment of a test department. Under the régime of G. B. Hazlehurst, general superintendent of motive-power, in 1893 or thereabouts the experiment was essayed in connection with the Mt. Clare shops of the company in Baltimore, Maryland.

This was a small beginning, comprising only a few machines for making physical tests of material, and with no chemical laboratory. The staff consisted of an engineer and assistant engineer of tests and two or three inspectors; one of these, the locomotive inspector, reporting to the general superintendent of motive-power.

For Moral Effect.

This arrangement endured for some time, until finally, under F. D. Casanave, who was head of the motive-power department of that road in 1901, the authority of the engineer of tests was greatly extended, including not only supervision of the inspectors which have been mentioned, but over the chemical laboratory as well.

As now constituted on the Baltimore and Ohio, and the same general plan is being largely followed, the test department receives all specimens from its various inspectors temporarily stationed at steel mills, car-wheel foundries, brass and iron foundries, tube mills, and axle works.

These are usually put through the prescribed tests simply in corroboration of the mill reports, and for the moral effect produced, in that the mill knows it is being checked by the home office of the purchaser.

There are two sets of tests, physical and chemical, and all the more important items, especially fire-box and boiler steel and stay-bolt iron, are subjected to both. Many of the castings must also be broken clean in order that the appearance of the metal may be observed.

On a large road, where considerable material is being purchased, and new equipment is on order, some six or eight material inspectors must be on hand for detail to any point where their services may be required. They are all supposed to be competent to test any material in accordance with the specification of the railroad company, and, of course, must be perfectly familiar with the construction and operation of the machines required for the various tests.

Not All Shop Men.

As a rule, these young men are technical graduates, or probably graduates of some correspondence course. Some may have had shop experience as apprentices, or even as mechanics, but this is not considered essential and is rather an exception.

They enter the service at about $65 per month as a minimum salary and, if special proficiency is displayed, may quickly rise to $100 and over, with expenses always paid while away from the office.

The first work is always in the testing laboratory, under the direction of the assistant engineer of tests, if the road has such an officer. If not, under the chief in person. In this they are familiarized with the various material specifications in vogue, and with the variety of printed forms for reports which they must forward while on the line

They are also "tipped off" regarding in what mill or shop bad work may be expected, and are shown the files where rejections are recorded, with the cause therefor.

Scope of the Work.

It is not until the engineer of tests is fully satisfied that the inspector is competent and trustworthy when not under observation that he is given a chance on the road, and this may be to any concern in the country with which the railroad company deals for its material. It may be also to one of the mills from which a locomotive-building firm having an order from the railroad may be purchasing.

To make this latter clear, suppose that the former Pittsburgh Locomotive

Works, now a branch of the American Locomotive Company, has an order from the Baltimore and Ohio for fifteen engines at $18,000 each.

It would be necessary, of course, for the builders to buy a considerable amount of material. For instance, not having facilities to produce it at the works, all boiler and fire-box steel must be purchased, also boiler tubes, stay-bolt iron, steel castings, and, in many instances, brass castings also.

The railroad company ordering the equipment has no voice in dictating where this stuff shall come from. The builder places his orders where he pleases, dependent on the market, the chance for securing prompt delivery, and many other considerations, but before it is delivered to him the railroad company insists on the privilege of having it tested at the mill by one of its own inspectors.

The building shop accordingly orders the boiler and fire-box steel from Homestead, for instance; and, when advised by the latter that it is ready for test, it in turn requests the engineer of tests of the railroad for whom it will build the engines to detail a man to the steel works.

Accordingly, one of his bright young men, armed with the necessary authority, as under the provisions of the contract, and with a grip full of forms and specifications, repairs to Homestead and remains there until the last sheet of steel is finally accepted by his chief, and not until then can the steel works deliver it to the building shop.

Each Piece Tested.

The tests of this material, while quite elaborate, could, of course, be made at the latter, but the wisdom of conducting them at the steel mill is obvious because, if any should prove defective, the expense of freight both ways would be saved.

An instance is recalled where between twenty-five and thirty sheets were shipped to the locomotive works without inspection and, after being examined, no less than eighteen were rejected. In accordance with the terms of the contract these were returned at the expense of the manufacturers, the total being quite an item, with the cost of production added to the freight charges.

The same general plan is followed in connection with the other parts. The cast-iron wheels may be ordered from Buffalo, and when all is ready the engineer of tests, on notification, will send an inspector there; another to the axle works; another to the stay-bolt mill, and still another to some brass foundry.

Detail of the Work.

The tests in connection with such material are very interesting, both through the procedure employed to make them and the large number of safeguards which are in evidence to guard against the possibility of poor or defective parts entering into the construction of the locomotive.

Those for boiler and fire-box steel are considered the most important, and will serve as an illustration of the manner in which preliminary acceptance, final acceptance, or possible rejection are determined.

These sheets, after being rolled, are spread out in the yard or some convenient place for what is called a surface inspection, which is the first move to determine their condition. The inspector simply walks around over them, making a general observation of their appearance; noting whether each is stamped in the proper place with its serial and heat number, and finally places on each his private mark for future identification when the sheets are checked up after delivery to the locomotive-building works.

The next procedure is to shear off the "coupon," or test piece, one from each sheet, and similarly marked with that which it represents. These coupons are intended for treatment in a machine of gigantic power which literally pulls each apart through a grip exerted on each end, and the number of pounds required to complete the dismemberment is taken as a partial indication of the strength of the sheet which that particular test piece represents.

Steel Must Stretch.

This is what is termed the tensile test, and previous thereto the various coupons are very carefully machined to insure

that the sides are absolutely parallel, no greater variation than 3-1000 of an inch being permitted. They are ordinarily about ten inches long, and the ends are so fashioned that they cannot escape the upper and lower grips of the testing machine.

The requirements of the test are very severe. The coupon must break at no less than 55,000 pounds, or no more than 65,000, and after the break occurs the two pieces, when placed together end to end, must show that they stood a stretch of no less than twenty-five per cent before parting. In other words, if the part between the ends was eight inches long originally, it must be ten inches after the fracture.

Should the test piece let go under 55,000 pounds the inspector would immediately reject it for "low strength," and if above 65,000 pounds, for "high strength." If properly within the above limits, and the elongation showed less than twenty-five per cent, the sheet from which it was taken must necessarily be rejected for "low elongation."

Inspector's Word Final.

These facts are illustrative of the exacting demands which are imposed upon steel manufacturers, but experience has proved that careful attention on their part toward securing a proper mixture of the ingredients entering into the composition of the steel will allow a margin of 10,000 pounds only as sufficient.

The work of pulling the test pieces proceeds quite rapidly, and as each coupon is broken the inspector records its serial number, the tensile strength, and the elongation on a specially prepared form, together with any comment which he may care to make, descriptive of the fracture, etc.

Such coupons as prove satisfactory are entered on one form, and those rejected on another. In the instance of the latter the inspector's rejection is final, and the steel mill immediately starts replacing the sheet.

On the record of the test pieces which successfully withstood the test is generally written — "accepted on physical test, but final acceptance dependent upon report of chemical analysis." Three copies are made, one for the information of the steel mill management, one for the engineer of tests of the railroad, and one for file.

Before forwarding the copy to his engineer of tests the inspector secures from each test piece about an ounce of clean drillings. These are deposited in separate envelopes, plainly marked with the serial number of the coupon from which taken, and sent by express, with the report above mentioned, to the test department of the railroad.

Chemical Requirements.

The chemical analysis of the steel is regarded as of equal importance. The usual specification, or, at least, the one recommended by the American Railway Master Mechanics' Association, is as follows:

	Per Cent
Carbon	0.15 to 0.25
Phosphorus shall not exceed	0.04
Sulfur shall not exceed	0.04
Manganese	0.30 to 0.50

Plates are frequently accepted conditionally by the inspector at the mill and rejected following the analysis of the drillings, hence, on receipt of the little envelopes containing the drillings, the engineer of tests hastens to turn them over to his chief chemist with the request that they be rushed, as delivery cannot be made to the locomotive-builders without the return by the railroad of "final acceptance."

On receipt of this important document, which is generally awaited with some expectancy by the manufacturers, the inspector tarries at the mill only long enough to check all accepted sheets and see that they are started to their destination, whereupon he returns to the test department of his company and reports for another assignment.

In the mean time other members of the staff have been pursuing their duties in like manner in other mills, and finally the conglomeration of material begins to pour into the yards of the locomotive-building works, allowing the actual construction of the engines to begin.

The engineer of tests of the Baltimore and Ohio, we will say, is now advised by the superintendent of the Pittsburgh works that material is on hand and that he may detail an inspector to observe

the progress of the work. Thus the material inspectors drop out and the locomotive inspector assumes the burden of supervision.

Must Know the Engine.

This man has a position of by far more importance than those of his companions in the office. He must primarily be a mechanic, generally a machinist, and, in addition, must have a broad general knowledge of all the various operations essential to the construction of a modern locomotive.

His work is to keep an ever-watchful eye on the work of machine, boiler, and erecting shops, and he has the right to reject any part or piece for poor workmanship, and to criticize any prevailing practise of the builders which may conflict with the standards established by his company.

He is armed on his departure from the test department with a set of blueprints and specifications covering every detail of the engines being built, and he is held responsible by his own people for the strict adherence of the builders thereto.

When the time for boiler test arrives he must certify, and in New York State make affidavit to the fact, that all legal requirements have been observed, and that the boiler is as safe as human experience and skill can make it.

Private Marks.

The fact that the material has been carefully inspected, as has been explained, before it reaches the locomotive works, or comes under his observation, lightens his cares to a considerable extent, as he knows from the stringent tests to which it has been subjected it cannot well prove defective in any particular; notwithstanding this, before he can allow any of it to be "worked up" or machined he must satisfy himself that it is the identical material mentioned in the various reports of the inspectors stationed in the steel, axle, and other mills.

This he is enabled to do through the fact that the sheets, axles, etc., are privately marked before coming to the locomotive works, and he has been advised of the character of the various symbols, and also where to look for them.

It constitutes a very heavy undertaking, however, as boiler sheets and the like are extremely weighty, requiring a crane and a gang of laborers to handle them, so in order to expedite matters the locomotive inspector is generally detailed to the builders' shops about the time when the first material has commenced to arrive.

He is thus able to check it off in small portions and make accurate note of where it has been deposited about the yard or storehouse.

Ten at a Time.

His real labors begin when the engines are being set up in the erecting shop, and when sometimes he has one on each of ten tracks to watch and a day and night force working. It requires a pretty good hustler to keep an eye on all this work throughout the twenty-four hours, and once in a while something inevitably "gets away" from him.

As a rule, however, so thorough has been the inspection before the parts reach the shop that it is very seldom anything of a serious nature arises to delay the work. If any such should occur, it generally results in some unpleasantness between the locomotive inspector and the builders, and the former has anything but a bed of roses.

The building concern naturally does not want the engines held up. They need the money, and, furthermore, they desire to get them off the erecting-tracks as quickly as possible so that they can proceed with setting up others, and the railroad company objects to the procedure also, as new locomotives are always in demand to move tonnage.

Thus the unfortunate inspector is placed between two fires, but if he is reliable and of proved ability, in nine times out of ten he will receive the support of his own people, who will allow him to hold the equipment until the faults are corrected, even at the expense of heavy loss to themselves. The authority of the locomotive inspector has been more clearly defined in recent years, and his presence at the works as a representative of the purchasers is set forth in the contract.

It is a trying job, of course, but through the exercise of tact, diplomacy, and common sense the duties can be made very pleasant. The writer held that position for a number of years on two prominent railroads, and always found the locomotive-builders ready to give and take. If a part was objected to after being finished, and a good reason given, it was always promptly replaced, and there was never any correspondence with the railroad company

In former years it was largely the fault of the railroad companies themselves, arising from the improper selection of men for inspectors, which caused the prevailing turmoil over their presence and the endless chain of letters which passed between purchaser and builder.

The men detailed for this important work in many instances were draftsmen, with absolutely no practical experience, and this fact once discovered in the shops resulted in an immediate loss of prestige.

The position is now considered equivalent to that of a general foreman, and the pay has risen to $125 per month, and even more, with expenses. Some of the inspectors are accompanied by an assistant, and many have a clerk from the home office to relieve them of the routine work of correspondence and filling out forms covering the progress of the work.

The builders hospitably provide a desk and blue-print rack, and often a typewriter, at their own expense.

General Handy Man.

There is generally enough new work going on to keep this particular inspector busy, but in the event of slack times the engineer of tests finds plenty for him to do in connection with special work for that office.

He may be assigned to inspect engines on the road, to investigate repeated failures to certain parts in service, formulate new shop practise cards, and is, in fact, a very handy man to have around.

It is regarded as a desirable position in the motive-power department, as the incumbent is frequently promoted therefrom direct to division or shop master mechanic. He is usually selected from the rank and file of the road and, differing from the material inspectors, finds it very difficult to break into the service in that capacity.

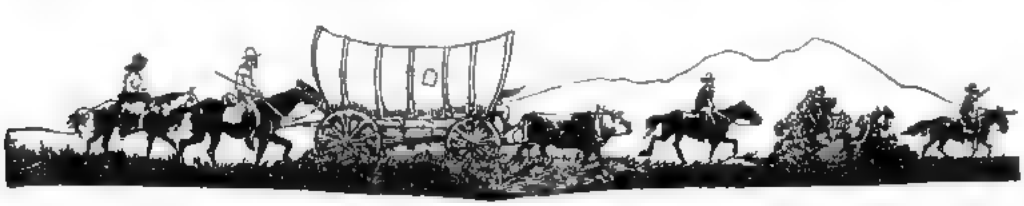
Under the engineer of tests are now being placed other inspectors in addition to those whose duties have been mentioned. He now receives reports from those detailed to observe car construction and also from those at the steel rail mills.

His office, in fact, is charged with the inspection of practically every article bought by the railroad, and the compensation for his labors has gradually increased from $75 per month, when the position was first established, to $4,000 a year in some instances.

Even the all-powerful purchasing agent cannot contract for any material in large amounts until specimens have been tested and passed upon. Since the engineer of tests now reports direct to the general superintendent of motive-power, his decision is final.

There is no more attractive field in railroading than this largely unknown department, and certainly none which offers greater possibilities for advancement. The work is varied and broadening in the extreme, as the inspectors on the road and in the locomotive shops have an opportunity to study at their leisure all the latest developments in machine tools and methods.

They are in addition thrown into daily contact with the shining lights of the mechanical world, those whom a shop man could never reach, and in that manner many have been elevated to remunerative and responsible positions with the firms where they have been detailed as inspectors.



The Dog-House Kid.

Pace Was in Need of Transportation So He Mustered Up Determination and a Baby.

BY A. HERSCHIN.

"MAYBE YOU'RE RAMBLING ON A PASS."

THE trouble with Pace was that he allowed his ardor to outweigh his judgment. When, with intense enthusiasm, he sought to organize unions among the employees of the lumber-camps, factories, and mines where he was variously employed, he was regardless of the effects of excessive publicity. Heedless of many lessons his invariable reward was—dismissal.

From one town of unsavory memory, where the mine-owners ruled with a rod of iron, he, among many, had been deported by a shotgun squad and left provisionless on the bleak, snow-covered prairie. On another occasion his enthusiasm had involved him with the "sapping" gang of the smelter, who beat him up and left him for dead

His was truly a nature to precipitate him into the hottest centers of the great labor wars in the West. He had been jeered and spurned by those who, right or wrong, he attempted to aid

At last, by devious routes, he was on the coast. For a time his fierce passion for organization was modified. Hounded, exiled, blacklisted, and hated, he determined to return blow for blow; to fight back as an individual, since he must do so without comrades.

He hungered for a home like others; and now where a tumultuous disposition had formerly been his undoing he had learned the lesson of secretiveness, of patience. Though the proletariat seemed unripe for unification, he saw at last that the material conditions under which they lived would finally impel it.

As a consequence of his suffering there burned in him a wild hatred for anything that stood in his way as he fared along. He would stake out a nest. Let them try to prevent him.

Physically, he was impressive — six-feet-two of hulking, heavily ballasted body, fairly dressed for a tramp, and of not unpleasing features. Like many another on the road, he worked when he could and until his protesting tongue interfered

Late in the afternoon he calmly boarded an empty gondola at Hepner Junction, and, selecting a sheltered corner, disposed himself in a manner warranted to excite the fury of the overworked shacks.

He dropped a roll of blankets from his shoulder, spread them, laid down, lit his pipe, and in a splendidly complacent mood interested himself in an old newspaper

The train rattled away with its long string of empties slipping gratifyingly fast to her destination in The Dalles yards, where the train-folk off duty an-

ticipated a glorious blowout at the annual ball. As the speed increased under the hogger's impatient hand, the kid shack swung down from the top of the car ahead and dropped over into the gondola.

For an ominous moment he stood, with gloved hands on his hips, silently contemplating the placid tramp's offensive ease. Then he burst out angrily:

"What yer ridin' on, feller?"

Pace slowly laid aside his paper, took his pipe from between his lips, and after a deliberate survey of the brakeman, slowly condescended:

"This car, young feller; this car I'm riding on. What do you think, a biplane?"

"Y' are, hey?" the kid snarled back. "Well, git outa here quick, or I'll t'run yer off! Yer hear? Git!"

Pace rose and stood erect. What opposition the kid imagined himself capable of offering vanished at the sight of the man's herculean proportions. He towered over his diminutive disturber.

Pace waited, meanwhile enjoying the disappearing bravado that the shack had first assumed.

"Doesn't look healthy to start something, does it?" the big one grinned. Then he advanced a step, shaking a threatening forefinger. "But," he said, "if you want action, begin now. Take it from me, though, if I go over the side you'll go ahead of me. Chew on that, buddy, and see how it goes. I stick till we get to The Dalles, understand? Take that back to your chief."

The kid silently turned away and abruptly mounted the end of the gondola. He climbed to the following car, turned and snarled a warning:

"All right, yer big bum; stay there. But yuh'll ramble quick in a minute, all right! An' I'll slip one over for myself. Yuh're a pretty fresh gink!"

The big fellow merely grunted indifferently and resumed his tantalizing smoking and reading.

Conductor Kline was in no amiable mood. At best his was a morose, taciturn disposition, and one unhappy recent occurrence had not served to render life's outlook more cheery.

Kline, the week before, had buried his wife. There, in an obscure corner of the graveyard on the outskirts of town, he and a few intimates had gathered to pay a final tribute to the departed. What little light and joy had been his was suddenly snuffed out when the sexton's spade patted down the smoothly rounded resting-place and left Kline behind with a motherless infant.

In the caboose the youngster whimpered objection to the unusual motion of the first train-ride. Kline was taking the baby away from the old painful associations. It lay in Kline's bunk, wholly unaware of its terrible bereavement, while he paced slowly up and down the narrow passageway of the moving coach, his head sunk low on his breast in bitter, gloomy thought.

"Say, Ed," came a bawling interruption as the kid entered, "there's a roughneck aboard us wot won't come through wit' th' coin an' won't hit the grit. He's big as a house, too, an' he looks like trouble. So yer better fetch yuh gun."

Kline made no reply. He reached quickly under a pillow for a revolver and put it into a hip-pocket.

"Lead me to him," he ordered briefly.

The two hastened over the swaying roofs of the rattling empties and came upon the rebellious guest. He had snuggled down into a deep, restful slumber.

A smile played on his lips as he dreamed—dreamed of that loyal little girl up in Butte whom he called wife, and the child that the last letter had told about. That brave girl sympathized with the absent husband and supported herself and child as a waitress and with the few dollars he occasionally sent her. That was why he wanted the coveted "nest"; that was why he was tired of profitless agitation.

Conductor Kline loudly commanded Pace to get up.

He opened his eyes in wide solemnity.

"Why," he objected, "should I? I'm comfortable enough as I am."

Kline pulled his gun and leveled it at Pace's head. "Get out of here now, or I'll drill you!" he grated. "Get!"

With Kline's last word Pace seemed suddenly vitalized into violence. With two swift movements he rose and seized the gun, then swung the back of one mighty fist against the conductor's face—a blow that sent him spinning dizzily.

He picked up the kid like a bag of

rags, laid him across his knee, and rained a torrent of crushing slaps upon him.

"You sneaking little pest," he roared. "I won't dignify you with a punch. Take that, and that, and that!"

Pace dragged him quickly to where the dazed Kline was just rising, and grasping the conductor by the shoulder, batted together the heads of his two tormentors. He kept up a running commentary of adjectives, personalities, warnings, and advice. He emphasized about every ten words with a particularly distressing bump of the aching heads.

Exhausted at last, he desisted by hurling the pair into a corner. In choicest mining-camp billingsgate he commanded them to depart and return whence they came, and thereafter let him alone.

They hesitated, deeming that duty demanded further resistance, whereupon the dictator leveled the confiscated revolver.

"Ramble quick now, while you got the chance, or I ain't responsible for results!

"And say!" he shouted as they hastened away, "I'll bet you'll never try to frisk or ditch another bo!"

Five minutes later he saw the ugly, black muzzle of a rifle steal over the rear car-top. Instantly came a loud report and a spurt of flame. Something buzzed close to his ear and flattened itself against the end of the gondola

Promptly his weapon flashed up and returned the fire.

The bullet struck the rifle-muzzle, ricocheted and snipped the cheek of Kline, who held it. Again Pace fired He was a dangerous marksman.

Kline fled ignominiously

Pace clambered to the car-top and sent a final menacing pill after his retreating figure.

"Phew!" whistled the conductor, swabbing his cheek, "that's getting out of it close, all right. Guess that guy's been in the military. Well, we can't dog him; that's a cinch. Looks like we've got to nail him on the quiet."

Pace held the fort. He knew, however, that more and worse was coming He realized the seriousness of his position. He was now an outlaw.

His dogged stubbornness conquered caution. When the train slowed down at a deserted water-tank, he dismounted ere his car had fully stopped and hastily concealed himself in the gathering twilight behind a pile of boulders near the track

Almost as soon as he had dropped from the car several brakemen, armed with rifles, tiptoed from the caboose. They stole up to the gondola, but their bird had flown.

Close as he was, Pace plainly caught their muttered curses of disappointment and anger. He chuckled and watched the search continue from car to car, finally concluding bootlessly far ahead up near the panting engine.

Suddenly he conceived a daring bit of strategy. He jumped to his feet and scrambled along in the screen of the rocks. Soon he was opposite the front stairway of the caboose.

He peered cautiously over the top of his hiding-place. The pursuers had disappeared. Quickly he stole over to the car, stood an instant listening, and, reassured, mounted the step and stepped inside.

Hurriedly he bolted both doors and jammed a heavy box against the front for a barricade. Then turning out the lights in the car, he took up a position in a rear corner, where, gun in hand, he could observe all movements through the glass observatory on the roof.

The search, he reflected, would extend to an examination of the rods also. Even now he knew that the party had rounded the head of the engine and were coming down the other side

Soon the train started. Occasionally the man heard a shot above the rumbling cars. He smiled at the waste of lead They were firing at random, not daring to expose a lamp, in the hope of drawing a reply from their quarry.

He laughed heartily as he pictured the elaborate caution and cunning of the trailers—how some of the more adroit were probably creeping over the roofs of the moving cars and dropping over the edge into the open doorways.

The man-hunt proceeded deliberately Plainly no possible nook was being neglected

He sat stolidly, his gaze fixed on the tower above. His fingers ran over the well-oiled barrel of the revolver, and he lamented the lack of ammunition. Only

three shots were left. The need of vigilance permitted no opportunity to ransack the place for replenishment.

A footstep sounded overhead!

He straightened up and cocked the pistol. Again the step. Then came a shuffling of indecision, as if the fellow aloft reconsidered his intention and moved away to rejoin his companions.

The lone guard breathed a deep sigh of relief. He was glad that the shack had not stepped to the observatory. The darkness left him little chance to choose between hitting his man and shooting to intimidate

Suddenly there came a startling interruption. A thin, plaintive wail rose from one of the bunks beyond!

The man sprang to instant attention.

"Great Scott!" he exclaimed. "A baby!"

He groped his way over to the couch and struck a match. In its dim light he saw a child squirming under the blankets and pawing the air with its tiny hands. On the covering lay an empty nursing-bottle.

All the harsh lines in the man's face softened as the crying continued. Helplessly he watched the baby's distress. He felt awkward and inadequate. Then impulsively he caught up the wee bundle close to his mighty breast. The tiny creature stared up at the newcomer and passed a midget hand over the rough, bearded face

The big fellow grinned delightedly

"Just like my own little jigger up in Butte. I'll bet a dollar," he murmured. "Say, kid, where's your mother, huh? Ain't you afraid of traveling with these shacks? Might get ditched, you know. Maybe you're rambling on a pass."

Unappeased, the youngster continued to weep. Pace chucked consolingly, tickled its ribs, shook its head, and made strange noises. But the little one yelled

Pace stood silently, bewildered, planning new tricks. Then suddenly, half in anger and half in desperation, he strode briskly up and down the narrow aisle, measuring his broken stride to a lullaby that was partly a disconnected tune and partly a yodel.

The yodling broke short. A horrible, grinding, rending roar. Earth's bottom dropped out. A sudden crushing blow—and all was blank.

Whatever was the immediate cause of the wreck will probably never be known

Five cars—gondola, three box, and caboose—suddenly left the track as they rounded a sharp curve. With a tremendous, deafening uproar they tumbled down and over in a great cloud of dust—a mass of hopeless destruction—to the bottom of a steep embankment.

Under the twisted wreckage they finally found him. He lay with his massive body cruelly pinned beneath the heavy timbers. Tightly, safely, he held his charge in such a manner that his own bulk shielded it from the imprisoning débris.

Conductor Kline and his men were directed by the groans from the injured man and the frightened wail of the young one.

For one long, insane hour the ax-gang hewed and slashed at the impeding mass. Ax after ax was nicked and blunted against interfering bits of metal and thrown aside as useless. One gang, exhausted, was spelled off by fresh volunteers—all but Kline.

Grim-faced, he labored with lusty swings—hands blistered and bleeding—viciously refusing the pleading offers of relief.

The perspiration and grime on his features flowed in and mixed with the freshly opened wound in his cheek.

He struck fiercely into studding, brace, and timber—sixty minutes of crippling toil that seemed like many days.

After an age of effort an opening was made. Into it plunged Kline on his knees—far in with lighted lantern—and with trembling hands he grasped his child. One swift look to assure himself that it was uninjured, and it was passed along to the eager men close behind.

He shifted his lamp till its rays fell on Pace's body.

Pace met Kline's eyes Painfully he extended a bleeding hand.

"Well, Mr. Conductor," he gasped, with a pain-distorted grin, "does this make us square? And can I ride with you now?"

A lumpy something rose in the conductor's throat as he gripped the other's hand in a meaning clasp.

"Yes, pardner," he faltered; "yes! As far as you like!"

HELP FOR MEN WHO HELP THEMSELVES—No. 50.

BY THADDEUS S. DAYTON.

Some of the Things a Man Is Expected to Know and Do When He Secures a Position in the Freight Department.

THADDEUS S. DAYTON.
Drawn by S. G. Cahan from a photograph

EXPRESSED in the simplest terms, railroading amounts to this: the operating department manufactures transportation; the traffic department sells transportation at certain established prices. The traffic department has two great classes of transportation, passenger and freight. Freight returns more than three times as much money as passengers. Two-thirds of the railroads' revenues come through the freight department.

Every point where freight is received for shipment is one of a thousand gateways for this traffic. Little rivulets of freight flow in and out of the small local stations all along the line. These unite with other streams, little and big. A great volume of through-freight passes the gateways at the junction points. All combined make the mighty flood of traffic that sweeps endlessly over the rails.

Each station agent is a representative of the freight department, but the station-agent in railroading is as the general practitioner in medicine. He must be able to handle all sorts of cases, but when he is in doubt he consults a specialist. A young man who desires to learn the freight business had better begin in a local freight-office in a large town or city rather than at a station where all kinds of transportation are handled

The local freight-office is charged with the receipt and delivery of the goods that are consigned to that particular point or are received there to be forwarded.

When a shipment is offered the consignor makes out and signs a "shipping-order." This contains the name and address of the consignee, a description of the articles to be transported and the terms and conditions under which the railroad company agrees to carry it to its destination.

Official Classification.

Every article is listed and classified in a book known as the "official classification." The first step that the freight man must take is to learn to which of the several classes of freight the shipment belongs. The United States is divided into three parts, each of which is known as a "classification territory." Each has its own distinct classification of articles. These classifications are known as the "official," "Southern" and "Western." They vary principally in minor details. A book for each is the guide for every freight man in that territory. Generally speaking, the Western classification rules west of the Mississippi; the official applies north of the Ohio and Potomac Rivers, and the Southern, south of those streams and between the Mississippi and the sea.

The classification of the goods, whether first, second, third, and so on, having been ascertained, the freight clerk turns to the rates which gives the tariff per 100 pounds or by the car-load from his station to the point to which the goods are destined. Suppose the goods take third class, the rate per 100 pounds for that class is 12 cents, and the shipment weighs 1,000 pounds. The clerk knows that the charge for the shipment is $1.20

Next the Bill of Lading.

Then he makes out a bill of-lading for the shipper. The bill-of-lading contains the same information as the shipping-order, but in addition gives the rate and class under which the shipment is made and the full amount of freight, if prepaid. The bill-of-lading is the consignor's receipt from the railroad company and has a definite commercial value. The original bill-of-lading must be surrendered by the person receiving the goods.

The next step is to make out the way-bill. This is done from the information contained in the shipping-order. The way-bill accompanies the freight and is the operating department's authority for carrying it. The way-bill is just as necessary for a parcel of freight as the ticket is for a passenger.

The freight clerk takes two impression copies of the way-bill. One he keeps for his records; the other is forwarded to the proper officer in the accounting department, where it is examined carefully to see if the rate charged and the other figures are correct. The freight-agent next enters the way-bill in his "record of freight forwarded," which is the basis of his reports to the auditor.

The freight is then loaded into a car, and the way-bill is handed to the train-conductor. When the freight reaches its destination the first duty of the agent or clerk who receives it is to check the goods from the car against the way-bill to see if anything is missing or in bad order. If there is any shortage or damage it must be noted on the way-bill and a special report must also be made to the general freight-office. Sometimes it happens that a shipment for which there is no way-bill will be found in a car. This necessitates an "over" report.

Then Examine the Way-Bill.

The next thing to do is to examine the extension and footing of the way-bill to see if the forwarding agent's calculations are correct. If any error is discovered, a special report is made. It is the usual practise of railways to hold the forwarding agent responsible for the correctness of the classification, rate, prepaid charges and advance charges, and the receiving agent responsible for the extensions and footings when shipped collect.

The freight-bill and delivery receipt is prepared next. The freight-bill is delivered to the consignee, who brings the original bill-of-lading, pays the charges, receives the goods and carries them away. The agent enters the way-bill in the "freight received" record, sets down in the proper book the amount of money he has received with reference to the way-bill number, etc.," and that is the end of the transaction, save for sending the money to the railroad's treasurer.

This, in its briefest outline, is the work connected with every freight shipment that is correctly way-billed, promptly transported to its destination, paid for and accepted on its arrival The duties of the agent at a junction or in a large commercial center are practically the same in principle as those of a man at a small station.

At a junction freight-office, however, more reports are necessary. There is the "passing report," which is a daily statement of way-bills of freight passing the junction from a connecting line. This record forms an important part in the intricate bookkeeping of the auditor's department.

Wages in Small Offices.

In a small local freight-office with twenty or thirty employees on the staff, the local freight-agent will receive wages of about $100 a month, his chief clerk will draw $75, stenographers $40 or $50, and the bill clerks $50 to $65 each. In such offices there is much interchanging of work, especially in vacation seasons,

and a young man has a good chance to learn the duties of nearly every branch of the business.

The bigger the freight-office the more clearly the work of each division is defined. In some of the great freight terminals there are as many as fifty men who do nothing but make out way-bills for freight forwarded and check way-bills for freight received. Another group does nothing but check freight on and off cars. The division of the men depends on the volume of freight handled.

In one of these big stations the agent may receive from $150 to $200 a month. The wages of his subordinates will be proportionately higher than those of men in smaller offices because a greater variety of freight is handled and a broader, more intimate knowledge of classifications and rates is necessary.

Even Experts Make Mistakes.

If no one ever made an error in description, weight, classification or rate, the general freight-agent's office would have little trouble, but even experts have been known to err about rates, and there are still as many debatable points in the classifications as there are about the customs tariff. The general freight-office at headquarters is always busy. Its activities may be broadly divided into directing its innumerable agents in their work and in straightening out the mistakes that are made in handling business

The head of the freight-department is usually one of the vice-presidents of the line. One vice-president will have charge of the operating department, another of the accounting, another of the legal department, another of the treasury and another of the traffic. There will be a traffic-manager for the freight-department and a traffic-manager for the passenger department. Each reports to the vice-president in charge of traffic.

A freight-traffic manager on a big railway receives from $10,000 to $20,000 a year, sometimes more. Few persons outside the auditor's and the treasurer's office know exactly what these big men are paid, but such things leak out now and then and make it possible to form a close approximation.

According to a road's organization there may be only one general freight-agent or there may be a score, each with some qualifying title, such as "general freight-agent, coal department." The territory of the freight department is generally divided up into several grand divisions. They may be the same as the operating divisions, or different, as the necessities of the service require. Each grand division is under direction of an officer, who is subject to the freight traffic-manager. These officers may bear the title of general freight-agent and may have several assistants in charge of separate sections of his territory, known as district freight-agents.

Scouting for Business.

In every large trade center along the line there will be a commercial agent, who is directly subordinate to the official next in rank to the freight-traffic manager. There are traveling freight-agents who scout for business.

It would be practically impossible to give any accurate figures relating to what the positions pay. They vary not only with each road but with different sections of country on the same road. A general freight-agent or assistant freight-traffic manager may receive $5,000 a year, or he may draw double that. The other general freight-agents' wages will run from $3,000 to $5,000 a year, which is about the rate of the most important commercial agents. The traveling freight-agents receive from $1,800 to $3,000 a year.

Another very important department is that directed by the freight claim-agent. This official, even on a small road, is not likely to be paid less than $3,000 a year, while on a large system it may run up to $6,000.

The freight-agents' traffic skirmishers—the district agents and the travelers—visit individual shippers on the line and on connecting roads. They cultivate business of the road in detail while their chief studies the territory in general. The general freight-agent must be posted on the markets of all great staples and a number of the smaller ones. Trade-papers and market bulletins reach his office with every mail. He can tell you why wheat is up or corn is down and the trend of manufacturing.

He must foresee the probable demand for cars. He should know where freight is likely to originate and devise plans to create new traffic. He must keep a sharp eye on the operating department and call attention to its shortcomings, such as delays in transit, for where there is no rate-cutting a road has to rely on the excellence of its facilities when soliciting freight in territory where there is competition with other lines. Also the general freight-agent must be an expert in rates. He must have every classification, tariff and commodity rate at his fingers' ends. This one thing alone requires remarkable skill and long experience.

Change in Tariffs Demanded.

Changes in tariffs are frequently urged or demanded. Such questions are usually discussed at meetings of the freight-agents of the roads which are likely to be affected, and it is then that the agent's knowledge must be sufficiently expert to enable him to assume the view-point most necessary to the protection of his company's interest.

The rate department includes from two to half a dozen specialists. They have a large staff of subordinates. Nothing but statistics are handled. The making of rates is reduced to as nearly a science as possible. The average cost of carrying a pound or a ton of freight one mile over each division and over the entire road is calculated with such minuteness that the string of decimals is almost bewildering. Classifications are subject to change also.

Freight tariffs are incredibly intricate. Rates are changing continually under the pressure of shippers or of civic bodies, or through a desire to establish more equitable schedules. The work caused by these changes may be imagined when one change alone in the official classification territory causes more than 8,000 changes in the rate-sheets.

The chief of the freight-tariff bureau draws from $3,000 to $5,000 a year, and his assistants receive what their knowledge and skill is said to be worth. It is hard work, and more than a mathematical mind is required. Most of the rate experts have studied the commodities that a railroad transports by actually handling them while working in a local freight office. They know almost as much about the physical conditions of their road as do the men in the operating department. They also have a general knowledge of business. The fixing of a single rate requires the experience of many persons who have spent years in the railroad service and have seen it from many angles

The freight claim-department is just as important in its way as the rate department. The claims adjusted by this department may be divided into "overcharge" and "loss and damage." There are several subdivisions, but the two great sections named above take in ninety per cent of the work.

Suppose you ship a case of feather-dusters from South Brooklyn to Ogdensburg, New York. Feather-dusters come under Class 1, and the rate is, say, 44 cents a hundred. Every local freight agent accumulates a big file of tariffs and supplements making changes in them. It would seem almost impossible for a man to keep track of them and do anything else. The agent may see the regular tariff rate of 44 cents on feather-dusters, boxed, but he may have a faint recollection that there is a supplemental tariff making the rate double first-class, or 88 cents.

He tries to find the tariff, but the shipper or his truckman is waiting, and so, to be on the safe side, he bills out the shipment at 88 cents. He feels that if it is wrong the agent at the other end or the men in the auditor's office will correct it. On the other hand, if he billed out the goods at too low a rate, and they were delivered at that rate, he or the delivering agent would have to make up the difference, the undercharge, it is called.

The man to whom you shipped the feather-dusters sends his truckman to the freight-station. The bill is paid at the 88-cent rate. If the consignee finds that he has no record of any rate higher than 44 cents, he writes a letter to the local agent or to the general freight-office, attaching his expense bill for the shipment and making a claim for overcharge. When the claim reaches the general freight-office it is turned over to the freight claim-agent

A postal-card is sent to the writer, informing him that his claim has been entered under such and such a number and will be duly investigated. Meanwhile the consignee's letter and expense bill are attached to a "back," or folder, of heavy manila paper and is referred to one of the clerks. If it is a clear case and the rate is wrong the local agent is instructed to refund the proper amount to the shipper, accept his receipt, and return all papers.

Overcharge claims are usually settled quickly unless some disputed point arises regarding the classification, for instance. Then the growing file of papers is referred to the experts in the office. It may be too much for them, and, if so, it is referred by the general freight-agent to the classification committee, and perhaps reaches the Interstate Commerce Commission before the claim is finally adjusted.

Claims for goods lost in transit are the next easiest to settle. To prove the loss may take some time, but it is essential. If the road cannot find the missing freight, it must pay for it. The value of the shipment, however, is frequently a cause for dispute, but in matters of this sort, where the claimant can present proper proofs, there is little difficulty.

Prompt Settlement Is Not Easy.

Claims for damage to goods in transit or while in the possession of the railroad are usually less easy of prompt settlement, especially when the damage is not apparent from an inspection of the outside of the package and no notation of it has been made on the way-bill. Then it is necessary for the claim-agent and the claimant to cooperate and make a settlement that is acceptable to both parties.

The claim-agent's decision usually is final in his department. Only the most difficult questions are referred to him, however. The ordinary claims can be settled by his subordinates. The subordinates, except those clerks who are engaged in keeping the records, have not only a knowledge of freight business, but also of business human nature. A claim department that antagonizes the railroad's customers can hurt the line almost as much as the best of freight-agents can help it.

The freight claim-agent's chief assistants are paid from $150 to $200 a month. The other clerks, according to their rank, draw anywhere between $40 and $135.

The tracing department is usually a branch of the general freight-office. Many large shippers have their car-load shipments followed by wire tracer to destination. At every division-point and every junction-point a telegram is sent to the tracing department that the car in question was "in" and "out" at such a time and date.

Some of the large railroads have recently introduced another system of tracing freight by wire. In making up a train at a terminal the agent gives each of the cars in the train a special symbol and number, which designates the car in all its movements.

In the central office the telegraphic reports are transferred to a "freight board" which is divided into spaces representing terminals and the trackage between. One side of the board is used for east-bound trains, the other for west-bound. The board is supplied with small boxes which show by their position the location of all the trains in yards or in transit. Each box representing a train is filled with small pegs in holes. On the flat top of the pegs is pasted a label containing the information in the telegraphic report.

The head of the tracing department receives about $150 a month. It may be higher on a very large system. Much of the clerical work is purely routine, care being the principal requisite. Wages vary from $40 to $75.

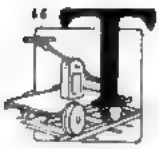
Most of the work of the subordinates in the general freight-office is in that necessary to charge and collect proper rates for the transportation and to straighten out the tangles that are a part of every big business. The work of these departments is necessary, but it is not as productive of freight revenue as the selling or soliciting department that comes in contact with the public and secures the business for the road.

The division freight agents, the local men, and the traveling men and their subordinates concern themselves chiefly with keeping cars full.

Trumping a Trick.

BY AUGUSTUS WITTFELD.

Sleepy Sam and Hard Luck Walter Find That Prestidigitating with Jewelry Isn't All to the Mustard.



"THESE annual exoduses of men and women on their vacations always make me feel like reaching for the arnica bottle," said Sleepy Sam, to Hard Luck Walter as they watched the crowds making for the ferries.

"What I can't understand," commented Walter, "is why any man, woman or child will work like a cake of yeast for fifty or fifty-one weeks every year and then be satisfied with a line or two out of the calendar for recreation."

"Look at 'em," continued Sleepy Sam. "There they go, with smiles on their faces and as much of the lengthy legal tender tucked in their jeans as they have been able to accumulate since their last trip.

"What are they up against? Why, some of them are going to do the truly rural stunt and put up with inconveniences that would make the Spanish Inquisition look like a lover's caress. Then they're going home and tell their friends of the 'delightfully lovely' time they've had. 'Oh, yes, thanks, dear. Perfectly delightful.'

"Others are going to the shore and some to the mountains, but I'm feeding you wisdom wafers when I tell you that most of them are going to do the only real work they've done during the year, for it beats the clock how hard a man will work to enjoy himself.

"You know the old saying, 'Pleasure is a jealous mistress and strikes with an iron fist.'

"Well, that may be their idea of a vacation, but to my mind a common, ordinary, everyday hop-toad's got 'em hopping on the vacation question. When a jump-frog wants to take a chunk out of the calendar, he digs down into his cyclone cellar, stuffs cotton in his ears and sets his alarm-clock for a six-months' snooze. He's an insect after my own heart and he's got the right idea as to what constitutes a vacation."

"Your sentiment has my most sentimental endorsement," agreed Walter.

"Did I ever tell you how me and Vaudeville Victor got into the spot-light at one of those rest retreats several years ago, and how we usurped the prerogative of the goat in trying to initiate a lot of those vacation votaries into the Order of Easy Marks?"

"If you did," replied Walter, "you must have been talking in your sleep, for I do not recollect it."

"Well, this thing happened several summers ago, when Vic and me were touring the Keystone State. We were doing the vacation circuit, with more or less success -principally less—when we bumped into this bunch of time-killers up near the Pokey Nose Mountains.

"Victor approached the hold-up hotel in a very circumspect manner and interviewed the cook lady at the near portcullis without success. He had tried all the arts at his command, including the noble art of prevarication, and had failed ingloriously.

"While he was busy distracting the attention of the culinary Celeste at the entrance to the pure-food laboratory, I executed a flank movement around to the side, lifted three temptingly luscious

tarts from the window-sill and beat an orderly retreat to the woods, laden with the spoils of strategy.

"When Victor joined me he reported that the only progress he had made was fleeing from the wrathful presence of the war-like Celeste. He said her heart was of re-enforced concrete construction and her tongue was so sharp it had the sword of Damascus looking like an ivory paper cutter—but then Victor was never popular with the slicker sex.

"I showed him the spoils of war and told him to keep his eyes on those tarts while I reconnoitered to see whether the dairy was open for business.

"I hiked across the fields and on my way I picked up a small tin bucket that had been misled by an underworked and over-paid farm hand. I made straight for the cow pasture, and, paying my respects to an ox-eyed blond lassie, I relieved her of about two quarts of lacteal fluid and beat it back to the woods.

"While we were busy getting outside of the kitchen-dairy repast, Victor commented on the wholesomeness of home-made pastry and fresh-laid milk.

"'Did you have any trouble in getting the milk?' says he. 'Did the lady put up any kick?'

"'Victor,' says I, 'I got this milk from the only real lady on the premises. She didn't put up no kick. She only switched her tail, and she did that to keep the flies off.'

"About the time that we finished our breakfast, we heard somebody calling for help somewhere in the woods.

"'Sounds like a cry of distress,' says Victor, inserting the last segment of pie into his face.

"'If there is anybody wants help around here,' I observed, 'we'd better form ourselves into a help-wanted column and advance to the rescue.'

"We waited until the cry was repeated, and then we started in the direction from which it came. As we advanced we heard the darndest lot of noise I ever heard outside of a menagerie, whilst every once in a while the fellow in distress would lift up his voice.

"'Sounds like a zoological garden in session,' says Victor. 'We want to be careful that we don't go butting into any suffragette meeting of the denizens of the forest.'

"Just then we came to a clearing in the woods with a tree in the center. Under the tree, a couple of big tom-cats of the back-yard variety were having a heated argument, while a healthy-looking, able-bodied man was perched in the lower branches of the tree.

"'What's the trouble?' I asked, addressing my remarks to the animal in the branches.

"'Be careful, my good fellow,' says the tree-man, 'those are wild cats.'

"'Sure they're wild, says I. 'I guess you'd be wild too, under the same conditions. What do you want us to do?'

"'Haven't you a pistol about you?' asked the tree-man. 'Those beasts should be shot.'

"I told him I'd left my automatic on my dressing table, as I had not anticipated running into any big game so early in the day. I suggested that if he would direct me to the nearest telephone booth I would gladly call up the police and have them send out a patrol wagon of armed men to render assistance.

"'There are no police in this section,' replied the tree-man; 'can't you kill those animals with a rock or something?'

"'Say, cull,' says I. 'If an ordinary cat has nine lives, a wild cat must have about eighteen. That's too big a contract for a man of my robust physique.'

"The tree-man looked peeved, and Vic and me stood there and watched those tabbies passing the catsup. No doubt if we could have understood their language we would have been scandalized. They were standing some four feet from each other with their backs arched and their tails looking like bargain-store boas. Every once in a while one of them would lead with his left for the other's jugular and tell him in choice cataphonics what he thought of his entire family.

"All of a sudden, a mangy, flea-bitten dog crashed through the bushes and made for those cats. The felines traveled so fast when they caught sight of that mangy pup, I might say that their flight was categorical. The 'ki yi' brought up the rear like a meteoric dog-star.

"After the hasty exit of the tabbies,

the tree-man lowered himself from the branches and mopped his perspiring high-brow.

"'That was a very narrow escape,' he said. 'It was very fortunate that that other animal appeared on the scene and pursued the wild cats. What kind of an animal was it? Do you know?'

"'That,' said I, very impressively, 'was a wild wild-cat hound. They breed them up here especially for the purpose. It is lucky for you that there happened to be one around when it was needed. How'd they come to tree you?'

"'It happened so sudden,' replied the tree-man, 'that I hardly know how it occurred. I was strolling through the woods when I heard them approaching, making the most horrible racket, so I simply climbed the tree to get out of their way, never dreaming that they would stop beneath it to fight.'

"'I guess they was fighting about which one of them was going to eat you,' said Victor. 'Them animals has powerful appetites.'

"'Dear me,' said the tree-man, 'how perfectly awful. Do you think there are any more of them around?'

"'Well, I can't say,' answered Victor, 'but if I was you, I wouldn't wander around these woods alone. You can't most always sometimes tell what you're going to run into. Of course, the fellows what run these resorts ain't telling their guests about the wild animals what's running about, as it would hurt their business.'

"'Would you two men mind seeing me safely out of this forest?' asked the tree-man. 'This adventure has me all unstrung.'

"Well, me and Victor saw that fellow safely to the edge of civilization and we told him that we were not averse to accepting a tip for our services. He came up with a dollar, easy money, and as we were making our get-away, after thanking him most profusely, he calls after us:

"'I say, men! Has either of you ever been on the stage?'

"We turned and faced the tree-man. 'Samuel,' says Victor, 'he wants to know if we have ever been on the stage, and me a head-liner! Why, sport,' he continued, addressing the tree-man, 'we're Thespians, traveling incog nit. If I tried to tell you all the kings and queens we have played to you'd think I was melding a winning hand at pinochle. What's the graft?'

"'You see,' says the tree-man, 'the guests at our resort are getting up an amateur vaudeville show in which everyone is to take part. Percy Longsuit and myself have never appeared in any of these affairs, and we wouldn't know what to do if we went on. It has just occurred to me that, for a consideration, you two might go on and do a turn for us. Of course the other guests must think Percy and I are doing the turn. If you went on as you are, they would think we are artists in the make-up line.'

"'Well, I don't know' says Victor, kinder uncertain like. 'When does this show come off?'

"'To-night,' says the tree-man.

"'Well,' says Victor, 'we have several pressing engagements, but we might accommodate you, if you make it worth while.'

"'There will be no trouble about that,' said the tree-man. 'Percy is willing to pay almost any price to escape the ordeal.'

"Victor told him that he thought it would be worth twenty dollars, and then he kicked himself for cutting rates when the tree-man agreed to the price.

"The tree-man said we wouldn't have any trouble passing ourselves off for him and Percy, as we were all about the same build, and then he asked Victor what kind of an act he intended doing

"'I'll pull off my prestidigitation stunt,' says Victor. 'It always makes a hit. If you can smuggle us into the auditorium some time this afternoon, I'll fix things up so that there won't be no hitch in the performance.'

"The tree-man told us to hang around near the barn, where the show was to be pulled off, but to keep out of sight, and he and Percy would find a way to smuggle us into the pleasure palace during the afternoon.

"Well, everything went off all right, and about four o'clock the tree-man hove in sight with Percy in tow. At least we guessed it was Percy—and we guessed right the first shot. Any man what couldn't guess that was no guesser.

"They took us into the barn and said

the rest of the guests were taking a post-prandial siesta—whatever that means—and that if Victor would tell him what articles he needed for his act they would try and get them for him

"The barn had been fitted up in a good imitation of a theater. A stage had been built at one end of it with a couple of small rooms on either side, which the tree-man said were intended for dressing rooms. Victor said that we would camp in one of the rooms until our turn came to go on, and that they could give it out that they had their properties locked up in it.

"Then he told them what he needed and they proceeded to get the stuff for him. After they had everything Victor required, we suggested that they bring us something to eat. They brought us a repast that did credit to their gourmetic accomplishments and gave evidence that they had a pull with Celeste, the cook-lady.

"We dined, and then the pair left us, promising to return in time to give us the cue for our act. While Victor busied himself getting his stuff in shape, I took a trip to slumberland.

"I tell you, Walter, there's nothing like a good nap to put a fellow on the sunny side of the boulevard, especially when you dream that you are holding down a job testing the restful properties of the product of a feather-bed factory.

"About seven thirty we heard a bustle around the place and we judged they were getting things into shape.

"'Say, Victor,' I suggested, 'can't we pull something more than that twenty out of this opportunity? It seems to me that we're letting those languid idlers off too cheap.'

"'Wake up, Sam,' says Victor. 'You don't for a minute suppose I'm going into this thing for a measly twenty, when there seems to be so much wealth and affluence resting here in idleness? When we go on to do our act, you keep your eyes on me and do exactly as I tell you, and if we don't get away with enough to keep us all summer I'm no mercenary magician.'

"Finally, the thing got started and we could hear those non-union actors and actresses doing stunts that reminded us of amateurs' night at Hatchetstein's and gave us a yearning to get the hook.

"By and by, Percy and the tree-man came in and said we were to go on in fifteen minutes and that we had better get a hustle on. They had the curtain down so that we could get our junk arranged and there was a girl out in front singing 'In a Beautiful Garden of Roses,'—at least that's what Percy said she was singing, but it sounded to me as though she was throwing a fit in a garden of nettles.

"We were mighty glad when the warbling nightingale took the count, for the next minute we found ourselves bowing to an appreciative audience. The way they gave us the glad-hand was evidence that they thought a lot of Percy and the tree-man or else that them two had a lot of money.

"'Ladies and gentlemen,' said Victor, advancing to the front of the stage, 'with your kind attention we will entertain you with some feats of magic. As our outfit is necessarily limited, it will be necessary to call on you frequently for such articles as are needed to assure success. I trust that none of you will feel any hesitancy in supplying anything that is needed.'

"After the applause had died out, Victor went ahead and entertained them for about twenty minutes by doing all kinds of mystifying tricks. I don't know where he learned the business, but he had Signor Blitz looking like Chinese money.

"Then he announced that he was about to perform his masterpiece. He said he would require a lot of jewelry to perform the trick and that the more they furnished the more they would be mystified. He asked that all jewelry furnished for the trick be wrapped in the tissue paper which I would distribute to the audience, and deposited in the bag which I would take around

"He gave me a lot of tissue paper and a muslin flour-bag, and I got busy. While I was taking up the donations, I noticed that Victor had left the stage. I wondered what he was up to. The people in the audience evidently mistook me for Percy, judging from the remarks they addressed to me, and one gushy gushy 'damosel knocked the wind out of me by whisperingly asking me if I loved my pidgie widgie. Wouldn't that upset your animosity?

"When I got through collecting, the bag weighed about ten pounds. I carried it up and handed it to Victor, who had returned to the stage.

"'Where have you been?' I asked.

"'Collecting the twenty from Percy,' he answered.

"'Ladies and gentlemen,' he announced, tying a knot in the neck of the bag, 'I will now make the bag and its contents disappear in full view of the audience. Watch it closely and see if you can follow it.'

"He took me to the right of the stage and stood me in front of the switch-board which controlled the electric lights of the place. He placed me facing the left, holding the bag at arm's length.

"Stepping back about ten paces, he took a revolver and aimed, as I thought, at the bag, and fired. As the shot rang out I heard a crash behind me, and instantly every blessed electric light in the place went out—and so did I. You don't catch me staying in no dark hall with a bag of jewelry.

"Outside I bumped into Victor. He told me to get a hustle on, and we beat it for the woods. While we were putting distance behind us, I asked Victor what had happened to the lights

"'I had to put them out some way,' he said, 'so I plugged the fuse in the switch-board with my little pistol.'

"The march through the wilderness brought us to the railroad, where we jumped a freight. The next morning we were in Philadelphia.

"We went direct to a fellow Victor knew, to dispose of the loot. He took us into his private office and proceeded to examine the glittering jewelry. He unwrapped piece after piece without making any comment. When he had it unwrapped he turned to us, grinning.

"'Say, fellows,' he chuckled, 'what you been doing? Robbing a five-and-ten-cent store?'

"'What do you mean?' asks Victor.

"'Why, look at that junk,' said the fence. 'It is the kind that the novelty houses sell by dry measure. I think it is listed at four-ninety-eight per bushel.'

"Victor and me looked at the stuff. You could have bought us for about thirty cents a yard when we realized what we'd landed. Any man that would have paid the list price for that stuff needed the restraining influence of a strong mind to look after his finances. We had been buncoed."

"Do you think those people put up a job on you?" asked Walter.

"Well, I don't know," replied Sleepy Sam, "but I'm inclined to think that a summer vacation bunch makes mighty slim picking. Of course, my views may not coincide with those of the people who run the summer resorts, but that's what I think."

THE SUNNY SIDE OF THE TRACK.

TIME: 7.08 P.M. Place, Wilkinsburg, Pennsylvania.

Q—"What time is the next train to Pittsburgh?"

A.—"Seven eight. It is due now."

Q—"Has it gone yet?"

"EDWIN JOSEPH," said the brakeman's wife, "take the rake and rake those dead leaves off the front lawn."

"'Deed I won't," replied Edwin. "You think I'm going to violate the contract? I'm a road man—I don't work in the yard!"

A DENVER school-teacher asked a small boy what river separates the United States from Mexico.

"The Rock Island," he replied

"No," she replied, "it's the Rio Grande"

"I knew it was named after some railroad," said the boy

A TALL, nervous man entered the department where lost articles are kept.

"Anything turned in here to-day?" he shouted to the man at the desk

There was no reply

"I say, has anything been turned in here to-day?" he repeated in a louder tone of voice

"Yes, sir," calmly replied the man at the desk without raising his eyes

"Well, why couldn't you say so? I've lost an umbrella"

There was no reply.

"I say I've lost an umbrella."

"I heard you, sir."

"You heard me? Well, why can't you tell me what was turned in?"

"Well, sir, a man was in here this morning who turned his toes in. They wouldn't happen to be yours, sir, would they?"—Yonkers *Statesman*

MAIN LINE MATTERS

Can Rails Be Kept from Creeping?—Roads that Still Issue Passes—How Torpedoes and Fusees Are Made—Bucking Wild Game on South African Railroads—Longest Tunnel Being Bored by the Canadian Pacific—Brazilian Railroad Cost Ten Thousand Lives.

BY CHARLTON ANDREWS.

WHY RAILS CREEP.

Those On Eads Bridge Over the Mississippi Move Twenty-Two Inches Daily.

A RAILROAD track appears to be one of the most solid, immovable things in the world, yet it is continually creeping in one direction or the other. The problem of creeping rails is one of the most difficult that is awaiting solution in the science of railroading. The best spikes, the best ties, the finest ballast may be used; the rails may be bolted and fish-plated in accordance with the best and most scientific practise and experience, but they will creep.

One reason is the continual contraction and expansion due to heat and cold; another, the heavy pounding of the equipment and the "drag" exerted by trains weighing hundreds of tons going up grade and down. Unless closely watched, the dreaded "kickout" or "kick-up" is sure to follow.

The place where trouble may be found is on a down-grade, followed by a curve and then an up-grade. A long and heavy freight-train comes along. Its total weight, including the big engine, is in the neighborhood of two thousand tons.

Just as he approaches the down-grade the engineer applies the brakes sufficiently so that the train will stay taut and not crowd down upon him while he is on the curve. If the cars were running loose and gathering speed, some of them might jump the track.

When the brake-shoes grip the wheels the treads begin to pull at the point of contact with the rails. The combined tractive force of this frictional pull is very large.

The rails are shoved forward an infinitesimal fraction of an inch, and the joints at the foot of the grade get the full force of the mighty downward drag. At the lowest point before the up-grade begins the ends of the rails will be found pressed tightly together.

When the train starts on the up-grade the wheels give a succession of backward "kicks" that cause the rails to slip backward as the cars move for-

ward. On a single-track road, where there are trains in both directions, it has been found that the creeping of the rails on the level is less than on a double-track where the trains move all in the same way on the same track.

If the rails are not carefully watched and repairs made at proper intervals the rails are likely to "tie themselves in a knot" at the point where the downward pressure reaches its climax.

In order to give the rails a certain amount of "play" and counteract creeping, slotted holes for the spikes are drilled through the tie-plates.

To keep the spikes from working loose by the contraction, expansion, and forward and backward movements of the rails, the bolt holes in the plates joining the rails are also slotted.

On a track a 36-inch wheel makes 650.2 revolutions a mile. Its pounding is equal to an impact of 2,801.2 tons distributed over that distance. This is called the static tonnage. The other factors are the weight and number of the trains. It is no wonder that the rails creep under such stress.

The standard rail now in use is 33 feet in length, which makes 24 joints less in each mile of track as compared with rails 30 feet long, but the crawling and creeping of rails has been found to be greater with the longer rails than with the shorter.

When a sudden "hot spell" of weather settles down on any section of the country it causes all the rails to expand. Then it is that the creeping that has been going on toward the foot of the grades reaches a climax.

There is no power more irresistible than the expansion of steel. The track on the curve at the foot of the hill must give somewhere. It has been known even to kick to one side, the rails and ties sometimes moving as much as three feet. This is known as a "lateral kick."

The kick always moves in the direction of the least resistance. Sometimes it is upward. Trackmen call this a kickup. There have been cases where trains have encountered these upward bending rails that have been arched as much as two feet above the ties. Although engineers are on the lookout for such things, they sometimes happen so unexpectedly that a wreck is the result.

The most remarkable case of a kick-up occurred in Texas a few years ago. A work-train with a number of men aboard was crossing a long ridge over the South Fork of the Canadian River.

Part of the train was on the bridge and part on the track of the approach when the rails kicked up under the middle of the train

The Canadian River was running high after a big spring freshet. The train was moving at a snail's pace and was stopped before the kink in the rails ditched the cars. But the kickup was so bad that the train had to be cut in two and the track repaired before it could proceed.

Taking the kinks out of the track is a hard job. The men start at the top of a grade and work downward. The rail-ends at the top are the farthest apart, and these are forced back until they are close together, one after another, clear down the hill.

At the foot it may be found that the track has been shortened some 12 or 18 inches. This is not patched by putting in a piece of rail of that length. There is enough steel, but it is in the wrong place. The curve at the bottom of the grade is lined up and that closes the gap. If there has been a kick-up a new rail is cut to the required length and fitted into place.

There are few accurate statistics about creeping rails. Each piece of track would give different figures, according to the local conditions. The creeping of the rails on the Eads Bridge over the Mississippi River at St. Louis, however, has been measured frequently.

Hundreds of trains pass over this bridge every week. Fifty feet of rail is cut every month from the east end of the east-bound track and from the west end of the track over which the west-bound trains pass.

It is calculated that the rails on the Eads Bridge travel in one direction or the other about 22 inches a day.

It has been necessary to put in a "creeper device" on one end and a feed-rail on the other in order to correct the movement and prevent unexpected gaps in the steel. At this rate it would take a rail about two years to

work its way from one end of the bridge to the other.

MUST ISSUE PASSES.

Though the I. C. C. Objects It Is Necessary Still to Give Away "Comps."

NOTWITHSTANDING the effort of the railroads to cut the issuing of passes to the minimum, the number of "annuals," "quarterlies," "trips," and other kinds is still very great

The Interstate Commerce Commission is very strict regarding free transportation. Its rules define the classes of persons to whom passes may be issued. Only certain railroad officials are entitled to annuals good on all trains. Others, lower in rank, are denied "first-class" passes. They must be content with annuals that will not be honored on limited trains. Some minor department heads and chief clerks are refused annual passes unless the nature of their business requires them to be traveling constantly in the service of their company. The ordinary employee must get along with a trip pass.

The Interstate Commerce Commission also prescribes the exact wording of each form of pass and the time limits within which it may be issued. Even the printed forms of requests for passes have been "edited" by the commission. An accurate record of all passes requested and issued must be kept by each road, and periodical reports for the commission must be compiled.

Only a person who is actually on the pay-roll of a railroad as a regular employee is entitled to a pass under the Interstate Commerce Act. A railroad has more latitude when it comes to giving free transportation over its line within the boundaries of a single State. Even in that case few railroads are inclined to be as liberal with their transportation as they were before the present regulations went into effect.

The smaller Western roads, even before the I. C. C. restrictions, issued free transportation far more freely than the Eastern lines. It was no uncommon thing in winter when travel was light for the pass clerks of some roads running out of Denver to receive the hint that the cars might as well be kept full, and that it was not necessary to closely scrutinize requests for passes.

But in the face of all restriction there are Eastern roads that now issue from 15,000 to 20,000 annuals a year. Most of these are in exchange for annuals over other lines. In trip passes the number fluctuates from 50,000 to 200,000, according to the extent of the road and local conditions.

Most of the lines running out of New York, and especially those that, having general offices in this city, furnish their clerks quarterly passes between New York and their homes in the outlying suburban towns. This is a great advantage to an employee who has a family and cannot afford the costly living of the metropolis. In the large general offices between 50,000 and 75,000 quarterly passes will be issued to employees in the course of a year by each road.

MAKING TORPEDOES AND FUSEES.

The Manufacture and Use of Two Important Signals.

RAILROADS use "fireworks" every day. Torpedoes pop and fusees flare no matter whether it is January or July; but there is no joy in railroad pyrotechnics. They are just as important as any other part of a road's equipment.

The railroad torpedo, or detonator, is attached to the top of the rail on the engineer's side of the track. It is held in place by two small flexible metal straps that are easily bent about the tread of the rail. When the locomotive's trucks passes over a torpedo the sharp explosion that follows indicates danger ahead. The report is a little louder than the crack of a .38-caliber revolver.

The explosion of one torpedo is a signal for the engineer to stop. If two of them are placed on the track not more than two hundred feet apart it is a command to reduce speed and look out for a stop signal or danger ahead.

Fusees are constructed a good deal like Roman candles, but instead of popping they burn steadily for several minutes. They are attached to a sharp iron spike, and when properly hurled to the

ground will stick upright in the ballast or in a crosstie. Sometimes they are thrown from a moving train. The momentum will actuate them to land point downward

Standard railroad fusees burn red, green, or yellow. A red fusee on or near a track is a danger signal. An engineer must not pass it until it is burned out. When burning green it is a caution signal. Yellow is also used for the same purpose. A train approaching a green or yellow fusee may proceed with caution.

A fusee must be lighted and left by the flagman whenever a train is running on the time of another train, or behind its own time, and under circumstances which call for such protection.

Standard fusees burn red for three minutes and yellow or green for seven minutes. They cannot be blown out by the wind, and rain will not extinguish them. A fusee that will burn one color so many minutes and then switch to another color is one of the most ingeniously simple devices of modern railroading. When an engineer sees a fusee burning red for three minutes and then change to yellow or green, he knows that the preceding train is three minutes ahead of him, and that it has stopped or else is proceeding at slow speed.

Every train is equipped with these portable signals. They are a part of every flagman's equipment when it is necessary for him to go back to protect his train from another that is following it. Fusees have been used for many years. They can be seen for a considerable distance even in foggy weather.

BAGGING RAILROAD GAME.

In South Africa the Train-Crews Have Queer Experiences.

GEORGE STEPHENSON was once asked what would happen if a cow got in the way of his locomotive, the Rocket. He replied, "It would be bad for the cow."

That was over ninety years ago. It is hardly likely that it ever entered the mind of the inventor that locomotives would eventually collide with "cows" of a very different species from the domestic bovine in the jungles of Darkest Africa.

African railroadmen, particularly trainmen, have plenty of excitement to relieve the monotony of their work. In addition to the common or garden cow, which, having reached an age when she is no longer a source of income to the farmer, is allowed to stray on the track in the hope that it will be "bad for the cow" and good for the owner when the next train comes along, there are such African "cows" as elephants and hippos—and the locomotive does not always come off so well as Stephenson imagined.

A few months ago a cow elephant disputed the right of way with a Rhodesian locomotive running tender first. It was bad for both. The elephant handed in her checks and the engine and tender were thrown into the ditch. Luckily the trainmen escaped injury.

Between Beira and Umtali, on the Beira and Mashonaland Railway, the track runs through the jungle, and, although the denizens usually make themselves scarce at the approach of a train, they are occasionally caught napping

Big-game hunters, as a rule, are armed with the latest weapons. Driver Norman, however, who runs on this section, uses the "cow catcher" of his locomotive, the 8, with great success. At the end of last year he bagged a fine lion. In January last, the 8 again distinguished herself, this time the "bag" was a huge female hippo.

Norman was making a night-trip from Beira to Villa Machado. About fifty miles out, when traveling at a good speed, the locomotive crashed into this ton or so of meat and leather. The impact, fortunately for the enginemen, threw the hippo clear of the track, otherwise Norman's career as a big-game hunter might have ended.

Having recovered their breath, the enginemen got down to investigate and found Mrs. Hippo badly crippled. Suddenly there was a rustling in the bush at the side of the track and another hippo emerged, grunting. He was Mr. Hippo in search of his better half.

Being unarmed, the enginemen thought discretion the better part of valor and made a dash for the engine. The guard tried to break the world's

record in his sprint to the van. On the return trip, at daylight, Commandant Bizarro, of Villa Machado, accompanied the train, and at the scene of the encounter a stop was made and a couple of well-directed shots put an end to both the injured beast and her male companion, who had remained in faithful attendance.

Smaller game which pay the penalty for trespass on the railroad track are buck of various kinds, jackals, and monkeys. Trains are also frequently held up by caterpillars, worms, and locusts which swarm over the rails, and the greasy mess, which is the result of their annihilation, frequently makes it necessary for all hands to shovel ballast on the rails for over a mile sometimes, in order to give the driving wheels a grip

Snakes, too, attracted by the heat retained by the rails after sundown, often nestle between the blades of switches. They are mostly poisonous, but are just as much afraid of man as he is of them, and make for the nearest hole or bush on his approach.

Then there is the ostrich! In the Karroo desert of the Cape Province, where the cattle feed on dry bush instead of grass and cows gather substance for their milk by licking out discarded condensed milk cans, the farmers breed ostriches. The average ostrich can make a hearty meal off a couple of brick and a few spikes.

Ostriches are great on breaking fences, and cattle-guards are useless where they are concerned.

On the approach of a train an ostrich allows it to pass and then starts running in the same direction, gradually gathering speed until the train is left behind. The bird then makes a dash across the track in front of the locomotive and sometimes is not quick enough. Then the feathers fly and the railroad pays the damages.

C. P. R. TO BUILD LONGEST TUNNEL.

Will Pierce Rockies 14 Miles at $100,000 a Mile.

A DOUBLE track railway tunnel, sixteen miles long, the longest in the world by nearly four miles, is being planned by the Canadian Pacific Railway. This tunnel is to pierce the Rocky Mountains through Kicking Horse Pass. It must not be confused with the tunnel for which contracts are now being called, near Rogers Pass, through the Selkirks in British Columbia. The two tunnels will be many miles apart and will be separate and distinct undertakings.

The Kicking Horse Pass tunnel will link Alberta and British Columbia. It will pass under the crest of the Rocky Mountains. Its eastern outlet will be in Alberta; its western in British Columbia.

Close estimates, made in comparison with similar tunnels in the Swiss Alps, indicate that the tunnel, with all modern appliances for construction, will cost over $14,000,000 and will take seven years to build. It will be the longest tunnel in the world.

The Canadian Pacific has a great plan afoot in the West. For purposes of commerce the company proposes to practically eliminate the Rocky Mountains.

It is the plan of this railroad to have no less than three or four distinct routes from Winnipeg to the Pacific Coast. Two of these routes are already partially completed. One of them, the present main line, is completely done except for tunnel improvements.

The line partially built is the Crow's Nest line, which, after traversing the Kootenay country to Nelson, will almost certainly be directed to Portland, Oregon, through the Cascade Mountains. The object of this line will be to capture the fast through freight trade, mainly meats and fruits, between the Pacific States and the Canadian prairies.

The third trans-Rocky Mountain and British Columbia line will be *via* Edmonton, in the northern competitive territory. Two very practicable passes remain in the north—the Pine River Pass and the Peace River Pass. Both would open up fine productive territory, and either would give the C. P. R. what it is ambitious to attain—easy access to northern Pacific ports *via* Saskatoon and Edmonton.

If the fourth route matures it will be through Kerrobert, Lacombe, Tuttle,

and Loch Erne; thence through the mountains, reaching the coast in central British Columbia.

The building of the Kicking Horse Pass and Rogers Pass tunnels, the extensive improvements in British Columbia grades and lines and the creation of the Souris to Lethbridge short-cut on the C. P. R., constitute one of the biggest building projects in North America

It is claimed that completion of these improvements will give the C. P. R. a main line three hundred miles shorter than that of any other transcontinental railway.

On completion of improvements the C. P. R. will have more favorable gradients and curves probably than any road in the United States.

It will take seven years to build this new tunnel, provided the contractors at each end, by their united efforts, can pierce the mountain ten feet in every twenty-four hours.

The cost of this tunneling will be approximately $14,000,000, based on the estimate of $500 per lineal yard. Considering the cost of other similar tunnels, this is not excessive. The Lotschberg tunnel in the Swiss Alps (described in another article in this issue), between the cantons of Bern and Valois, cost $15,400,000, or $750 per lineal yard. The Lotschberg tunnel is four miles shorter than the proposed Kicking Horse tunnel.

The cheapest tunneling in the world on extended railway mountain work was that of the Swiss Arlberg Railway. This tunnel is 6.36 miles long, and the average cost per lineal yard was $540 It was built thirty years ago, however, and the improvements since then in air-drilling machinery will permit the Canadian enterprise being carried out at a lesser cost per lineal yard.

The Kicking Horse Pass was a historic stumbling block thrust in the pathway of the Canadian Pacific Railway. It was Sir William Van Horne's genius for railroad construction, combined with most laborious investigations by some of the best engineers in the world, that enabled the C. P. R. to penetrate the barrier with the four-and-a-half-per-cent grade that existed for twenty years. That grade has lately been reduced to two and a half per cent, and it will be less than one per cent when the tunneling is completed. The route will also be shortened by five miles.

THE MADEIRA-MAMORE COMPLETED.

Brazilian Railroad Cost 10,000 Lives to Build 250 Miles.

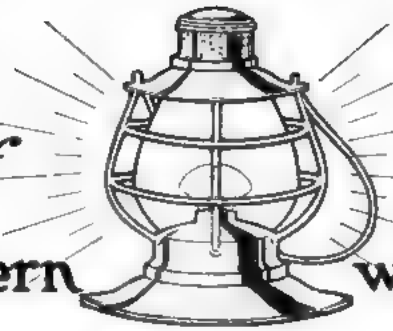
THE Madeira-Mamore Railroad of Brazil, South America, the scene of Mr. H. M. Lome's novel, "The Paymasters," published complete in the July issue of THE RAILROAD AND CURRENT MECHANICS, is one of the most famous railroads in the world. It was completed recently, after a struggle that lasted for thirty-seven years. The final triumph came to May, Jekyle & Randolph, New York contractors. Announcement that trains are now running over this remarkable railroad from one end to the other has been made at the office of Rodney D. Chipp, secretary of the South American railroads controlled by the Farquhar interests, comprising twenty-two distinct lines

Recently 3,500 workmen were taken off the general construction work after trains were operated the full length of the line. Eighty American civil and mechanical engineers who have been employed on the work for years are on their way to their homes in the United States.

It is estimated that in the thirty-seven years of its construction over ten thousand lives were sacrificed to the work, due largely to fever, beri beri, and other tropical diseases. The road is only 250 miles long. It connects the Bolivian frontier with Brazil and gives an outlet from Bolivia to the seaboard.

About forty years ago, after a war, Brazil seized the sea coast of Bolivia. When a treaty of peace was signed, one feature of it was that Brazil, having deprived Bolivia of its seaboard, would connect it up by means of a railroad around the rapids of the Madeira River. Owing to the character of the country, with its almost impassable mountains and dense swamps, the work of building the road was a gigantic task, and the Brazilian government at first tried many foreign contractors, who failed.

By the Light of the Lantern



Ask us what you want to know

WE want to be as useful as possible to our readers, but, because of the great popularity of this department, we are obliged to impose certain restrictions. It is limited to the answering of questions of an informative, technical, or historical nature only. All letters should be signed with the full name of the writer, as an indication of his good faith. We will print only his initials. The editor begs that readers sending in questions will not be disappointed if the answers do not appear as early as expected. It frequently takes weeks to secure correct answers, owing to the complexity of the questions.

DOES the New York, New Haven and Hartford Railroad always employ old locomotive engineers on their electric locomotives?

(2) When operating two motor-cars with the Westinghouse American Master Mechanics' equipment, should a leak occur on the brake-pipe branch between the double cut-out cock and the brake-pipe on the second car, our instructions state that both control and brake-pipe cut-out cocks between cars should be closed and the auxiliary drain-cocks opened on the disabled car. Would not the main reservoir cocks also be closed to prevent air from flowing through the open drain-cocks in the auxiliary reservoir?—G. W. B., Pueblo, Colorado

The New York, New Haven and Hartford Railroad has instructed their old locomotive engineers who have been in steam service to operate the electric locomotives.

(2) No. We are under the impression that you are handling the M-22 brake-valve and double-valve instead of the older type M-15 valve of the A. M. M. equipment; but in either case you will understand that first, small leaks are not sufficient cause for cutting out brakes and thus reducing the braking power on the train. Second, when operating the brakes on two motor-cars with one brake-valve the cut-out cocks under the other three brake-valves must be closed; or, when operating two or more cars all brake-valves except the one in use are cut out. Third, when the double cut-out cock is closed the control-pipe as well as the brake-pipe is cut off from the triple valve; therefore, there can be no flow of main reservoir pressure to the type M triple valve when cut out according to instructions.

If, however, a control-pipe is broken beyond remedy you must first close the first stop-cock behind and ahead of the rupture and close the main reservoir cocks on that and all motor-cars behind the break. The train handling should then be given especial attention to the end of that trip, as the graduated release feature is cut out on all motor-cars that have the main reservoir cock closed.

S. M., North Yakima, Washington.—The letters C., N. O. & T. P. R. R. refer to the Cincinnati, New Orleans and Texas Pacific Railroad; the letters M., O. & G. Ry. refer to the Missouri, Oklahoma and Gulf Railway, and the letters A. C. L. R. R. refer to the Atlantic Coast Line Railroad.

WHAT is the cost of a mile of steam and trolley railroad, each requiring a four-feet road-bed and seventy-pound steel and cypress ties and 150 feet of trestle-work fifteen high?

(2) Is the third-rail system cheaper to install than the overhead trolley?

(3) Which is giving the best results, the third-rail or the trolley system?

(4) Are gas-electric cars cheaper to operate and to maintain than trolley-cars?

(5) What would be the cost of a 4-4-0 passenger locomotive weighing 40 tons, and a 2-6-0 locomotive weighing 60 tons?—A. H., Yoakum, Texas

Many things enter into consideration in railroad construction that are purely local—amount of grading, cost of right-of-way, legislation, *et cetera*. The average cost, including fences, ballast, *et cetera*, is about $17,000 a mile. In the case of a trolley road the rails must be bonded and a trolley-wire erected. This costs about $400 a mile for bonds and $2,000 a mile for trolley, including poles, wires, and labor.

(2) A third-rail single track will cost nearly three times as much with Catenary trolley construction erected.

(3) Both are giving excellent service. The third-rail system is limited inasmuch as it is not safe for high voltages. An overhead trolley construction must be used. In climates where there is dampness, it is unsafe and unpractical to use over 700 volts in a third rail

(4) No. They cost many times more than trolley-cars to maintain.

(5) The cost of passenger locomotives averages over five cents per pound gross weight

W. G. F., Lawrence, Massachusetts.—The Lehigh and New England is an independent railroad, extending from Tamaqua, Pennsylvania, to Campbell Hall, New York, 272 miles, with branches to Bethlehem and Martin's Creek, Pennsylvania. It owns 32 locomotives and 1,589 cars

The dimensions of the electric locomotives on the Hoosac division of the Boston and Maine Railroad are as follows: Length over couplers, 48 feet; width of cab, 10 feet; height from rail to roof, 12 feet 5 inches; diameter of driving-wheels, 63 inches; diameter of truck-wheels, 42 inches

A comparison between the finest trains in Europe with those in the United States and Canada would be as the poet Tennyson says, "As moonlight unto sunlight, and as water unto wine." The nearest approach, perhaps, is on a special express train running between London and Brighton, where there is a good attempt toward the perfection of American luxurious elegance

In regard to block signals, an electric current is used in practically all of them, except in the very earliest types. Sometimes a combination of electric power and hand power is used. In this case the signal is actually thrown by a lever in the signal-tower, but this lever is interlocked by electricity, so that the signal man cannot clear the signal if a train is in the block ahead.

E. O., Landpoint, Idaho.—The word "Lackawanna" is Indian. It was applied by Indians to a small river—one of the tributaries of the north fork of the Susquehanna River in Pennsylvania

A SHORT time ago I heard an old employee of a railroad declare that there had been no way discovered of passing two trains on a siding that was shorter than either train; that is, two trains, each a mile in length, could not pass on a siding one-half mile in length Is it true that such a method has never been discovered?—H. B. J., Omak, Washington.

It is not true. The matter is simple enough One part of the train can be placed into the siding and the other part pushed ahead a sufficient distance to allow the first portion of the first train to be backed out. Then the second portion may be similarly sidetracked, when the second train may proceed without further delay.

W. P. C., Coleraine, Minnesota.—The cost of a locomotive is not generally given out by constructors, but five cents per pound is a fair estimate of the price. Much depends on the material used and the number and variety of mechanical appliances. Eight cents per pound is about the maximum cost of high-class locomotives (gross weight), including tender

WHAT is a stay-bolt?

(2) Do stay-bolts have holes running through their entire length?

(3) What is the name given to the hollow pipes or bolts giving air to the fire through the shell of the boiler?

(4) Are there any stay-bolts used in the construction of a locomotive fire-box?—L. W N., Albion, Nebraska

A stay-bolt is a bolt with threaded ends used in holding the fire-box sheets to the outer sheets of the boiler. At the sides of the fire-box there is a hollow space four or five inches wide. The stay-bolt passes through this space and, after being securely screwed into the sheets, is riveted over.

(2) Some stay-bolts have holes through their entire length, others only a part of the way near the outside. Those having holes through their entire length admit air to the fire-box

(3) Hollow pipes are known as air-holes. In the case of riveted bolts they are known as stay-bolts.

(4) There are a large number of stay-bolts used in nearly all locomotive boilers

J. A. G., Toronto, Ontario.—The word "hog" as applied to a locomotive refers to switching-engines having four wheels. They have a resemblance to a four-footed animal, the nearest approach to which is, perhaps, the hog

A. T. H., Eldon, Iowa.—The Missouri, Kansas and Texas Railway has 3,090 miles in operation, with 586 locomotives and 26,082 cars. The road was chartered September 25, 1865, as the Union Pacific Railway Company, Southern branch. The name was changed May 23, 1870.

T. M., New York.—The Pullman Company own their cars and also provide for their service and maintenance by special agreement with the railroads on which they run. The American Refrigerator Transit

Company also owns its cars, of which there are 3,350 in operation. The builders do not give out the cost except to prospective purchasers.

K. E. S., Potomac, Maryland.—The markings, or classification, of locomotives on particular railroads are not governed by any absolute regulations. While the constructors of locomotives have a fixed table showing the particular markings and their meanings, these are subject to changes in the hands of the purchasers. Even the original classification of a locomotive undergoes changes in its markings in the course of time owing to organic changes that may be made. Copies of the classification tables may be had on application to the leading locomotive builders.

H. G. E., Gallup, New Mexico.—There is no law against using the available space on box cars for advertising purposes. Beef packers and others do considerable advertising on the sides of certain cars of their own.

R. M., Oakland, California.—An applicant for a position as fireman on a locomotive who has served a regular apprenticeship as a machinist has an advantage over an applicant not familiar with mechanical operations; but everything else being equal, the question of seniority would not be affected in favor of the skilled mechanic. The figures refer to the number of the locomotive arithmetically, beginning with No. 1. The average pay of a railroad machinist is about three dollars a day. It is less than that amount in the East and more in the West.

W. G. F., Lawrence, Massachusetts.—The Boston and Maine Railroad is controlled by the Boston Railroad Holding Company.

The rolling-stock of the New York Central and Hudson River Railroad and its leased lines consists of 1,807 locomotives, 2,345 passenger-cars, 32,571 box cars, and 3,687 flat and miscellaneous cars, making the total number of cars 67,830. Of the equipment leased there are 574 locomotives, 119 passenger-cars, 5,070 box and other cars, making a total of 8,110 cars.

J. L. C., Orange, New Jersey.—Frederick D. Underwood, president of the Erie Railroad and its allied lines, entered the service of the Chicago, Milwaukee and St. Paul Railway in 1870, serving as clerk, brakeman, foreman of elevators, conductor, yardmaster, and division superintendent. He served as general manager on the Minneapolis and Pacific Railway and other Western roads. In 1901 he was elected president of the Erie.

William H. Truesdale, president of the Delaware, Lackawanna and Western Railroad, was born December 1, 1851, near Youngstown, Ohio. He entered railway service as a clerk on the Rockford, Rock Island and St. Louis Railroad, now a part of the Burlington system. He has filled many positions on different American railroads. On March 1, 1899, he became president of the Lackawanna.

H. E., St. Anthony, Idaho.—The changing of compound locomotives to simple locomotives—that is, from locomotives with four cylinders to two cylinders—has been done on certain railroads for a number of years. Careful comparisons have shown that instead of securing any appreciable degree of economy by the use of certain kinds of compound locomotives, there has been a loss. When general repairs or complete overhauling became necessary, advantage of the situation was taken to apply single-cylindered engines. In this, as in nearly all other problems, there is the real test that brings about the survival of the fittest.

W. E. T., Honesdale, Pennsylvania.—A "wagon-top" boiler is a boiler having a conical or sloping course of plates next to the fire-box and tapering down to the cylindrical courses of the boiler. An extended wagon-top boiler may have one or more courses between the fire-box and the sloping course which tapers to the diameter of the main shell or cylindrical part of the boiler.

H. M. C., Rifle, Colorado.—The Johns Hopkins University is located at Baltimore.

A. H. Hawley is general secretary and treasurer of the Brotherhood of Locomotive Firemen and Enginemen. Address: Peoria, Illinois.

H. Shay is general secretary and treasurer of the Brotherhood of Locomotive Engineers. Address: B. of L. E. Building, Cleveland, Ohio.

W. J. Maxwell is grand secretary and treasurer of the Order of Railway Conductors. Address: Cedar Rapids, Iowa.

Ferd C. Schwedtman is chairman of the Accident Prevention and Workmen's Compensation Committee of the National Association of Manufacturers. Address: 30 Church Street, New York City, New York.

J. S. G., Copemish, Michigan.—As we have repeatedly stated, the exact prices of railway supplies are not available. Such prices, like other marketable products, are

variable In regard to the price of cars, write to the American Car and Foundry Company, Chicago; Barney & Smith Car Company, Dayton, Ohio; Osgood Bradley Car Company, Worcester, Massachusetts; Erie Car Works, Erie, Pennsylvania; Pressed Steel Car Company, Pittsburgh

M. McK., British Columbia.—A loses. The London and Northwestern Railway has 1,969 miles of track and the Canadian Pacific has 10,983 miles of track. These figures include all trackage

F. H. P., Manchester, Iowa.—The Chicago and Alton has recently placed in service a number of Pacific type locomotives built by the American Locomotive Company. They are considered the best in the service. Their general dimensions are as follows: cylinders, 23 inches by 28 inches. Driving-wheels: diameter, 80 inches. Boiler: diameter, 72 inches; pressure, 200 pounds. Fire-box: length, 108 inches; width, 66 inches. Wheel-base: driving, 13 feet 9 inches; engine, 34 feet 8½ inches; engine and tender, 66 feet 4 inches. Weight in working order: leading-wheels, 50,500 pounds; driving-wheels, 140,500 pounds; trailing, 48,000 pounds; total engine, 248,000 pounds; tender, 165,120 pounds; heating surface, 3,888 square feet; maximum tractive power, 31,475 pounds; tank capacity, 8,500 gallons; fuel, 14 tons.

J. M. R., Augusta, Georgia.—A horse-power, as originally promulgated by James Watt, the inventor of the modern steam engine, consists in moving 33,000 pounds one foot in one minute In calculating the horse-power of an engine the following is the common rule: Multiply the area of the piston in inches by the mean pressure per square inch, and by the piston speed in feet per minute, and divide the product by 33,000. The quotient will be the indicated horse-power.

The mean, or average, pressure on a double-cylindered locomotive will be about eighty-five per cent of the boiler pressure That includes both cylinders. A further deduction of ten per cent should be made to allow for friction.

MEASURING draw-bar pull in pounds, which train will pull the harder, one with 25 loaded cars ahead and 25 empty cars behind or one with 25 empty cars ahead and 25 loaded cars behind? Which one will require the most draw-bar effort to pull on a level track? If there is any difference, explain why.—A. S. V., Kansas City, Kansas.

There is considerable difference in favor of the locomotive draw-bar pull by having the loaded cars behind, for the reason that there is a loss by pushing a load, especially a heavy load, instead of pulling it. The best illustration of this fact is by pushing instead of pulling a chain along a level surface. In pushing, the tendency to buckle is very great; whereas, in pulling, there is little or no loss from this source. The lost motion by reason of the unavoidable wear of the rolling-stock and track renders the increased oscillation in pushing a considerable waste of force. This has been repeatedly proved by the use of the dynamometer—the exact ratio depending much on the condition of the rolling-stock and cars and weight of loads—the lighter loads not showing so much variation as the heavier loads.

R. W. F., Hoopeston, Illinois.—The reason that the Baker valve-gear dispenses with the use of links in reversing or cutting off the valve stroke is that a reversing or reducing bar takes the place of the sliding or oscillating link, the reversing bar having means to change the position of the bell-cranks that impart the motion to the valve-rod. There are sixteen pages devoted to the subject in the "Valve Setter's Guide," by James Kennedy (Angus Sinclair Publishing Company, 114 Liberty Street, New York)

In regard to the merits of the Jacobs-Shupert fire-box, a large volume was published recently, giving a description of tests made by Professor Goss of the University of Illinois, clearly demonstrating that the kind of boiler referred to stood longer under severe tests than the ordinary stay-bolted boiler. The complete prevention of low-water boiler explosions is, up to the present time, a complete physical impossibility, that is, as long as the fire is sustained at a high degree of heat.

Detailed descriptions of passenger and freight locomotives may be found in Angus Sinclair's "Twentieth Century Locomotives."

In regard to the breaking of a spring equalizer, the result would be that the frame of the locomotive would drop down on the side on which the fracture occurred until it rested on the top of the driving-boxes

E. S. R., Lethbridge, Alberta.—The only railroads in America to which the initials C. R. R. alone are used are the Crittenden Railroad, with headquarters at Crittenden, Arkansas, and the Cornwall Railroad, with headquarters at Lebanon, Pennsylvania. Neither of these roads pass through the district to which you refer

J. F. S., Galeton, Pennsylvania.—A locomotive improperly counterbalanced, with spring pockets on saddles riding on the frames and running on a soft-ballasted road, would have a most pernicious effect on its riding qualities. The vibration would be very

great and the incessant shocks would inevitably lead to fracture. The complete rebuilding of the track would involve considerable expense, but the readjustment of the locomotive would be comparatively easy. Such false economy cannot be other than expensive in the end.

T. S., East Oakland, California.—A roundhouse, as its name implies, is a circular or semicircular building for housing locomotives when laid up for running repairs, boiler washing, or waiting for trains. There is usually a turntable capable of holding both engine and tender in the center of the circle. This table is movable, and may be turned to any of the stalls where the locomotives are to be moved. The part in which the locomotives are housed is roofed, but the central portion, where the turntable is located, is open.

J. C. D., Dubois, Pennsylvania.—In the dispute referred to, we would not care to venture an opinion without hearing both sides of the story. It is to be presumed that the despatcher would not enforce any regulation at variance with the rules of the company employing him. Railroad companies generally sustain the decisions of their officials, otherwise the position would be untenable. In a case of gross injustice, the Brotherhood of Locomotive Engineers will see that justice is done.

A. E. S., San Diego, California.—The smooth side of a belt should always be placed to the pulley, regardless of the fact that "it is not the way the critter wore it." The surface of the pulley is smooth and, therefore, the grain, or smooth side of the belt, should be placed next to it to eliminate friction.

T. S. B., Patrick, South Carolina.—In regard to the first railroad in America, see our answer to R. A. L., Danielson, Connecticut, page 155 of our June, 1913, issue.

The branch of the Southern Railroad referred to still runs over the original track. The Charleston Railroad was the first railroad in the world to decide positively that steam engine should be used. This was at the suggestion of the chief engineer, Horatio Allen. See "The Romance of American Railroads," by W. S. Wright, the RAILROAD MAN'S MAGAZINE, August, 1912, to January, 1913.

F. B. A., Chicago.—The Railroad Supply Company, Chicago, will furnish full particulars about tie-plates, which is their specialty. Supply companies, as a rule, do not publish price-lists, as prices vary according to the demand for material. The plates also vary in price according to the weight of rails and ties that are adaptable to the service required.

A. O. H., Oklahoma.—There are 2,300,000 cars in use in the United States.

The railroads of the United States employ 1,729,144 men.

The longest railroad in Canada is the Canadian Pacific. It is 10,983 miles in length. In the United States, the Chicago, Burlington and Quincy is the longest, 9,003 miles.

L. A. T., Hopkinton, Massachusetts.—The best way to secure a position as signalman is to make a study of that occupation and go at it in a thoroughly efficient manner. One cannot be a signalman unless he is particularly adapted to the work and is thoroughly reliable, sober, and has a complete knowledge of signaling. We understand that the schools advertised in this magazine give a thorough course of instruction.

F. R. I., Veteran, Nevada.—The Pacific type of locomotive is popular in passenger-service for the following reason: Heavy trains and fast schedules require powerful locomotives. The weight on drivers must be sufficient to start the train, and the boiler must be large enough to furnish sufficient steam for the maintenance of high speed. These qualities are admirably combined in the Pacific, or 4-6-2, type.

The Great Northern Railway has 7,782.59 miles of track, 1,236 locomotives, 1,043 passenger-cars, 51,506 freight and miscellaneous cars, and 10 rotary snow plows. It has used Mallet locomotives for six years.

The gage of the Panama Railroad is 5 feet. It is 50 miles long, has 55 locomotives, 49 passenger-cars, 1,240 box cars, and 137 miscellaneous cars. Colonel George W. Goethals, U. S. A., is the president. His offices are at Culebra, Canal Zone. The general offices are 24 State Street, New York City.

J. O. M., Montreal, Canada.—Samuel Slater, the English machinist and inventor who came to America to establish a mill for cotton manufacture, was born June 9, 1768, and died April 21, 1835.

The cotton gin was invented by Eli Whitney in 1792.

Knitting is supposed to date back to 1527.

Playing-cards were invented in 1392. They were the outcome of an effort to amuse King Charles VI.

John Rennie, an English civil engineer and

mechanic, was generally credited with the present form of steam-dredging machine with a chain of buckets, although this device is said to have been used previously by Sir Samuel Bentham. John Rennie was born June 7, 1761, and died October 4, 1821. He must not be confounded with Sir John Rennie, the British engineer who restored Boston Harbor

J. C., Manhattan, Montana.—A Pacific type passenger locomotive weighing 280,000 pounds will cost about $25,000. An Atlantic type passenger locomotive weighing 184,000 pounds will cost about $16,000

VOTER, Bangor, Maine.—Official returns from California gave the highest elector on the Roosevelt ticket 283,610 votes, and the highest elector on the Wilson ticket 283,436. As between these two electors the Roosevelt plurality was 174. The highest Wilson elector and one other elector on the same ticket, with 282,651 votes, were, however, successful, defeating the two lowest electors on the Roosevelt ticket. The State's vote in the Electoral College will be 11 for Roosevelt and 2 for Wilson

M. Y., Bliss, Michigan.—The inhabitants of the earth number 1,623,300,000. They live on 55,641,102 square miles, an average of 29.23 inhabitants to the square mile

The average duration of human life, according to statistics, is only 33 years. One quarter of the earth's inhabitants die before they reach the age of 6 years, one half before 16, and only one in every hundred live more than 65 years.

A. B., Brooklyn, New York.—In regard to the amount and location of the work now being carried on by the Union Switch and Signal Company, you should address your communication to that company. The general office and works are at Swissvale, Pennsylvania

THE LAST CAMEL-BACK.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

REGARDING your reply in "By the Light of the Lantern," that the camel-back locomotive is too wide at the back end of the boiler, or, in other words, its fire-box was too wide to admit placing the cab in the usual position, you probably have reference to the Mother Hubbard type of engine. The fire-box of a camel-back was placed between the frame, and the boiler above the frame was little or no wider than the fire-box, as they were only about forty-ton engines.

There were, however, two distinct types of camel-backs. One was of the ten-wheel type, what we now term the 4-6; the other was also a ten-wheel engine, but these wheels were all drivers. This type was known as the Ross Winans camel. It derived its name from its maker, Ross Winans

The cylinders of both types were on a slope of about thirty degrees, while the valve and steam-chest were level. The back end of the boiler was on a slope of forty-five degrees, starting on a line just over the throat-sheet, or back-flue sheet, and sloping to the boiler-head, which was only 15 inches above the fire-door

The fireman stood in what was called a kitchen, and shoveled the coal from the tank floor two feet above him. His only shelter was a canopy roof attached to the tank.

All stops were made by the fireman, who used a brake-club. Those were the days when the term "tallow-pot" could be used justly Many a time I have gone out on the running-board to the steam-chest to open a valve with a funnel on the top of it while the engine was drifting and pour hot tallow into the steam-chest. That was our lubricator

Then a man of inventive ability came along. He extended a pipe from the cab to the steam-chest, and he was pronounced a wise man This was followed up by the Detroit lubricator, which ended our troubles; but the camel-backs knew little or nothing about Detroit lubricators, as they were condemned by the State of Ohio and relegated to the rear. The last camel-back was the 227 of the B. and O. This engine did its last road work pulling local on the Shawnee division between Newark and Shawnee, Ohio. It was afterward used to switch shop-cars at the Newark, Ohio, car-shops, and was then presented to the Chicago Historical Society. I understand that the old engine is now at Purdue University, Indiana. The old engine went to her new home under her own steam

When camel-backs were in their prime they were equipped with two pumps, one on tie cross-head and one on the back crank-pin, yet some of them had both pumps on the back crank-pin. Later they were equipped with Mack injectors. The "camel" disappeared about 1900.—V. C. F., Paducah, Kentucky.

FIRST ELECTRIC HEADLIGHT.

EDITOR, THE RAILROAD & CURRENT MECHANICS:

REGARDING your reply to L. J. S., Minneapolis, in your June number, concerning the first electric headlight, I wish to state that the first electric headlight in this country was built on the plant of the Warner & Swasey Company, Cleveland, Ohio, about 1885.

It was built for and used by the old Pittsburgh and Western Railroad, now a part of the Baltimore and Ohio, and proved very successful.

The actual work of construction was performed by Frank E. Jones, one of the most widely known mechanics in Ohio.—E. R. J., Elyria, Ohio.

White Demons.

BY JANE WARREN.

SYNOPSIS OF PREVIOUS CHAPTERS.

IN a village thirty miles north of Peking lives William Warren, his wife, and daughter. Mr. Warren is in business with one Leung Lo Nieh, and through this partnership he has been enabled to keep on friendly terms with the natives of that section. Edward Kingdon, Jane's *fiancé*, arrives on the scene with news of an uprising not far distant, and alarming reports near at hand. He urges flight to Peking. Ominous sounds reach them from the near-by village, and they decide to leave that night. In the pursuit which follows the bridge is fired and Jane is captured by Tsing Lao, leader of the local Boxers. He had asked previously that a deal should be made whereby Jane would be his wife. Tsing is set upon by Kingdon, and with Jane's assistance he is enabled to overcome the Chinese and throw his seemingly lifeless body into the river. Kingdon and Jane escape with the rest of the family in a boat, but at times are conscious of being followed by some one on the southern bank of the river. This is confirmed later, when just before reaching Chien-loo, a stronghold of the Boxers, a large rent is discovered in the bottom of their boat. Tsing is evidently alive.

CHAPTER VII.

Over the Great Wall.

We agreed that it might prove easier to evade our enemies generally than the lone man who had floated down the river on a fragment of the bridge, and who had succeeded in disabling our boat. We conjectured that he might give us, as eventually he did, more trouble than all the rest of the fanatical society together. We were satisfied also, that this man was Tsing Lao.

Naturally we supposed that his special hostility arose from his mad infatuation for me, but subsequent events proved that there was an added reason for his pursuing us with malignant pertinacity.

Edward scouted around in the vicinity of our landing-place for about ten minutes.

"Do you realize how near we are to Chien-loo?" he asked when he returned.

"I know that it can't be far away," father answered, "but there must be some interval, for I haven't seen a certain landmark that I should recognize even in the dark."

"What was your landmark, a house?"

"Yes, one that stands by itself a little away from the village."

"The ashes of that house," said Edward, "are about a hundred yards from here in the line in which the boat is pointing."

Father expressed his consternation in a whispering "Whew!" Edward continued:

"The village is evidently unusually quiet, what there is left of it, but from the fact that lights are occasionally blotted out for an instant, I judge that some persons are moving about. Right in front of us are stretches of open fields that extend along the river farther than I can see, but at the other side of the fields there is a grove, if not a forest.

"We must make for that grove, and we shall have to go on all fours. It won't do to remain in the vicinity of the river, for when the alarm is given, as it may be any minute, the river and its shores will be searched first. If it wasn't for that we might retrace our steps in the shadow of these bushes until we got far enough away to cross the fields without risk of being seen."

While he was making this report Edward was busying himself in coiling a light rope about his shoulders. This done, he told us to sacrifice as much

Began in the June The Railroad and Current Mechanics. Back numbers for sale at this office

baggage as possible and hand what must be taken to him.

He helped us to land. It seemed with every twig that rustled as we pushed through the bushes that the people in Chien-loo must hear us. My fancy pictured them bending their heads to listen and straining their eyes in our direction to discover what it was that made the foliage stir upon so still a night.

I could see lights in the village before I was clear of the tangle and did not need Edward's warning to stoop. So, out into the open we went on hands and knees, Edward leading, I next, then mother, and father brought up the rear.

It was a slow, toilsome journey! The distant grove seemed to recede as we crawled toward it. I began to believe that it was some species of mirage, and we had not gone a hundred feet before I despaired of accomplishing the task my lover had set.

My palms stung from contact with stones, my knees ached, my skirts were an exasperating impediment. I had to remind myself sternly of my vow not to be a burden, and though I fortified myself by repeating it and insisting that what others could endure I could, I yet had to whisper, "Must we proceed this way, Edward?"

"We must," he answered, "but you may rest if you want to."

"I do not want to," I responded, ashamed of myself, and we struggled on.

I cannot tell how far we had gone, but we were still where we could see the village lights—that I know, for I was constantly turning my eyes toward them—when suddenly we heard a murmur of voices that speedily rose to cries of excitement

"Lie flat!" came Edward's aspirated command

Down we dropped all four of us—and listened. For my part the earth seemed to be all of a tremble, my heart thumped so violently.

More than before we realized how close we were to the village, for as the clamor increased we could make out many a word, and more than once I was sure I recognized the tones of Tsing Lao's dreaded voice.

Edward propped himself on his elbows and raised his head.

"All the lights have been put out," he whispered, and we knew that not even the insensate cries were such convincing evidence of danger; for when the mob rules in China, all who are not a part of the mob go within doors and keep their dwellings darkened.

The shouting grew in volume and seemed to focus itself, as if men were running from various directions to a central point. Soon the clamor became so confused that all the voices mingled in a discordant roar, and no single word detached itself from the tumult.

Then the noise suddenly died away, and for a moment the night was as still as it had been at any time when we were floating down the river.

"Their leaders are holding a consultation," Edward whispered, "or one of them is making an address. I wish I were near enough to hear what orders are issued."

Presently it began to look as if we might learn the orders, for across the field came the sound of a single voice, but though the tone was loud and passionate, we could not understand what was being said at the distance

But a moment later we could infer what had been said sufficiently for our purpose. The crowd broke into that dreadful chorus of which the refrain was "Death to the foreign devils!"

For a few seconds these words rang out again and again, and then confusion followed with a noticeable diminution in the volume of tone. It was as if the crowd had been facing us and quickly turned its back while continuing to shout. Another moment and the cries became still less distinct, although the volume of noise seemed to be the same.

"I think that means," whispered Edward, "that the mob has started to the river and passed behind some buildings of the village. We'll start on again"

But for the menacing terror of it I should have been thankful for the pause we made. I had rested. Thereafter, in spite of smarting palms and aching legs, I struggled on without wishing to stop The vivid, though unseen, demonstration of our peril stimulated me as nothing else could

Before long I was tormented by a new pain due to keeping my head thrown back upon my shoulders. Let any one who wishes to comprehend it, stand in

an otherwise natural attitude and look straight up to the zenith for several minutes. The throat will parch and the spine take on a sense of brittleness. It will seem as if the head might be set rolling by a light blow, as you may flick a flower from its stem with a riding whip. I carried my head relatively in that fashion that I might be able to see my way.

After a time the intolerable muscular agony convinced me that I was seeing my way to no purpose. I never saw sufficiently to avoid pricking my palms, and as for the distant trees where we hoped to shelter ourselves, there was small likelihood of encountering an obstruction among them. They seemed as distant as at first. So I let my head hang and looked at the slowly passing ground, confident that if I should stray from the course the others would observe the fact and recall me.

It was a great relief, and for some distance, inches it seemed to me, I floundered on in comparative comfort, when suddenly I bunted my head plump into the small of Edward's back. He had halted and risen upon his knees for the sake of an observation.

"What's the trouble?" asked father from the rear.

"Nothing," said Edward; "a harmless collision. We might as well rest a bit. I don't know how you others feel, but I'm outrageously tired"

How considerate he was to confess fatigue and thus make us feel justified in resting. I had no doubt that if he had been alone or with others of his strength, he would have pressed on, but I was only too glad to take advantage of the respite. I turned to mother, who had stretched herself face down, and asked her how she fared.

"How much farther have we to go in this way?" she queried in return. "I do not give up yet, but if it is very much farther I shall have to ask you to leave me and save yourselves."

"Mother!" I exclaimed, horrified at the suggestion.

"It won't come to that, Mrs. Warren," said Edward, who had heard her. "We live or die together. It will be a saving of time to take refreshment."

"There is some rice wine in the hamper," said I.

"Good! I should like a swallow of that myself. Never was so thirsty."

Father had the hamper on his back. He lost no time in opening it and finding the flask that had been put in as the result of the unfortunate Zila's thoughtfulness. While we were taking turns in moistening pieces of bread with the wine, Edward called attention to flickering lights moving along the river-bank.

"They are searching the shores," he said, "and that shows that up to the present they have not dreamed that we would venture to cross the open fields. As they cannot see us at this distance, we'd better walk the rest of the way."

"Do not delay for me," said mother, rising. "I can go on now. I could do so even if it were still necessary to go on all fours."

I could believe her, so infinite was the relief of the upright position. We walked to rising ground, and not long thereafter to the forest that had been our immediate goal.

We turned and looked back a moment before entering. A small fire was burning on the river-bank, from which we inferred that the Boxers had found our boat and were destroying it!

The rising ground that we had come to marked the southern border of the plain through which the Tungsi flowed, and from there on the hills rose rapidly until they became the mountains upon which the Great Wall was built. That barrier we must reach and pass before we could consider the first stage of our journey as accomplished.

Traveling under ordinary circumstances, we should have found it no obstacle, for here and there are arched gateways, roads passing through or under it. It is pierced, too, by various rivers, among them the Pei-ho which, though it does not flow through Peking, is the water highway connecting the capital with the seacoast and a portion of the country to the north.

Edward had hoped to proceed along the Tungsi to its junction with the Pei-ho and go by the latter river through the wall, and so on to Tung-chow, a city fifteen miles east of Peking, if it should prove that Wu had not been able to arrange for horses and a guard. This arrangement was the most desirable, and now it was our only resource.

As we stumbled on through the forest Edward told father just what Wu would try to do and where he would be found whether he succeeded or failed. There was a gate in the wall almost due south of Chien-loo, and that would have seemed to be the next point that we should try to make, but Edward advised against it on the ground that the Boxers would inevitably expect us to take just that course.

If they made any effort to follow us, they would proceed with all haste to the nearest opening in the wall to intercept us. But if we should have the good fortune to gain the wall ahead of our enemies, we were morally certain to be seen by travelers or peasantry who would report the fact to the first band of Boxers they encountered.

"I was convinced when we abandoned the boat," said Edward, "that we should have to climb over the wall, and that is why I brought along this rope."

The forest was soon passed, and after that the way grew wilder every minute until at last we seemed to be toiling over bare rock. If dawn had not been breaking when we saw the huge rampart crowning a ridge before us I really doubt whether we women would have had the energy to attain it.

The wall is not of even height throughout its enormous length. There are places where it has crumbled until a child could climb over it. We were not so fortunate as to come upon any such place. We had chosen as best we could the lowest spot in the section that was in view, but it was high and apparently as firm as when it was erected centuries ago.

The top of the wall is like a continuous roadway between stone copings, and the northern coping is pierced at short intervals with slots through which the ancient warriors were supposed to shoot their arrows at the enemy.

Edward cut a stout staff in two and fastened an end of the rope to the middle of one of the pieces. This done, he threw the stick over the top of the wall and yanked at the rope until it caught in one of the slots. He threw his whole weight upon the rope and it held.

"Now then, ladies and gentleman," said he, "the elevator is at your service."

He smiled at his own pleasantry, but we were too tired to respond in kind, too tired to feel alarm, grief, or anything but weariness.

"Think you can climb it, Mr. Warren?" Edward asked.

"I'd have made sport of it twenty years ago," replied father; "after breakfast perhaps I can manage it."

"You're right," said Edward; "breakfast is the next thing. We can sit here and see that no foes are in sight. We don't know what there is on the other side of this fence. I'll have ham and eggs and coffee and dry toast, if you please."

"How can you be so flippant, Edward?" I asked peevishly.

"Don't know," he answered good-humoredly; "but there's no profit in tears."

As we ate and took sparing sips of the rice wine I was amazed to note how my spirits rose. But even under the stimulus of food I could not overcome wholly the sense of past horrors.

One incident of that breakfast in the shadow of the Great Wall must be set down because of its connection with subsequent events. I was struck suddenly with the briefness of the time that had elapsed since we began to take measures for flight. Not sixteen hours had passed since Edward appeared at our home, now a heap of ashes, and they seemed to be as many days.

"Which reminds me," said Edward, "of our trophy. I said we would examine it if the sun rose on us this morning."

He took from his pocket the article he had wrested from Tsing Lao and handed it to me. I examined it first with repugnance and then curiosity. I suppose it would be called a badge, though tag might be the better word, as there was no pin with which to fasten it to one's garments.

It was a rectangular piece of copper apparently, with several words in Chinese characters scratched on one side. A tiny ring was set in each end, and through these had been passed the cord which held the article at Tsing's throat.

We all looked at the thing. Father said that the characters formed the motto of the Boxer society with some other syllables of cabalistic nature.

"Possession of that badge," said Edward, "implies that Tsing is really pretty high up in the society, doesn't it?"

"I think so," father answered. "These odd words may convey his title in the order."

He passed it back to me.

"I don't want it," I said. "It makes me shudder to think of that dreadful wretch."

"The badge is innocent enough in itself," remarked Edward. "Why not keep it to show to friends in America? They would be mightily interested in it."

I was still inclined to throw it away – but I kept it.

Edward showed mother and me how we were to place the looped end of the rope under our shoulders, and instructed us how, as we were pulled from above, to walk with hands and toes along the perpendicular face of the wall so as to keep our faces and bodies from bruising contact with the stones. Then he climbed to the top hand over hand.

"Pretty small rope for such a purpose," he remarked, looking at his palms after he had gained the summit. "Baggage first."

Father fastened our impedimenta to the rope and Edward pulled them up. Then he let the rope down again and father mounted, declining Edward's offer to pull him. After that it was mother's turn, and my heart actually beat fearfully as I adjusted the loop for her. She observed my apprehension and rebuked me with a sweet smile.

"It is a most unconventional proceeding," she said, "and I am afraid it is not wholly dignified, but I trust that I shall not come to harm."

The men shamed my apprehensions by pulling her to the top without the slightest incident. I gave them a good deal more trouble when it came my turn by my overexertion to prevent my face from getting bruised; but up we all were at last and ready for the descent upon the other side.

The descent was not such an easy matter. The top of the wall on the southern side was equally far from the ground, and there were none of those slots which had been so handy for fastening the rope. Worse yet, the rope was not long enough to reach from a slot on one side over the wall and to the ground on the other.

"You and I can lower the ladies down easily enough," remarked father, in a puzzled tone, as he looked over the edge

"Surely," Edward assented solemnly, "and then you and I could draw lots to decide which of us should let the other down, the one who lost to remain on the wall."

"Even that wouldn't be so absurd," responded father with an anxious smile, "if it was a safe drop from here to the ground."

"It isn't safe," said Edward emphatically. "I take great chances when I have to, but I wouldn't take that one unless a crowd of Boxers were swarming over the other side. We'd best walk on a bit and enjoy the comparatively smooth pathway. Before long we'll come to some place where the drop isn't so great."

That solved the problem, for we had not gone far when we saw a tower on the wall half a mile away. The tower had been invisible from below on this account, else we should have gone to it for the upward climb, although the operation would have been conducted necessarily in the same way. We found, as we expected, that the descent was much less there than at the place where we mounted, and with no difficulty worth noting we made our way to the ground

"And now to find a place where we can rest in earnest," said Edward. "Do you realize that we have been traveling all night?"

We did, and we looked around hopefully at his words, as if somehow his ingenuity would raise a well-furnished house for us out of the barren rocks. The country thereabout was of the same character as that on the northern side, inexpressibly wild and forbidding. Not many miles distant we knew that there was an imperial highway, but for more reasons than mere fatigue it was out of the question to walk to it at once.

"Caves are not uncommon in these mountains," said father; "shall we look for one?"

"Nothing could be better," replied Edward.

In an hour we came to a cleft in the mountainside which the men declared

would do for our shelter till evening. I suppose it should be called a cave, but there was nothing imposing in its dimensions or appearance. The entrance was by a passage broad enough for two persons to walk in side by side. For a distance of a dozen feet or so this passage was between rising walls that eventually arched over a rude chamber hardly larger than an ordinary sitting-room. Below and above us the mountain extended for hundreds of feet, a rough, steep surface strewn with stones.

There was evidence in charred sticks at the entrance that other human beings had made this place a habitation

Mother and I took our turn first at resting while the men watched, they agreeing solemnly to waken us after four hours had passed.

It seemed as if I had no more than closed my eyes when father laid his hand on my shoulder and told me it was my turn to play sentinel. He aroused mother at the same time, and, after receiving explicit instructions as to our duties, we took our places in the passage and scanned the rugged slope below us.

We were told on no account to show ourselves, and to arouse the men at the first sign that should give us the slightest uneasiness.

We were obliged to awaken them sooner than we expected.

"Do you see, Jannie?" mother whispered, as she crouched suddenly.

I saw, and I drew back. Down at the bottom of the slope were three Chinese beginning to ascend. One of them I recognized as our special dread, Tsing Lao.

CHAPTER VIII.

A Skirmish.

MOTHER aroused the men and apprised them of the situation.

"Come into the cave, Jannie," said father, "and come on your hands and knees!"

The revolvers were on a jutting rock within the cave, but near the passage, and the cartridge-boxes were near them on the floor. The men took their stations at the entrance.

Nothing was said. The situation was too terribly simple to occasion debate. The enemy was at hand. These men were the forerunners of a numerous band.

Neither father nor Edward made the slightest attempt to get a view of the Chinese. It was enough to know that the foe was approaching, and prudence dictated that no sign be made until at least the vanguard was within range. Their heads were slightly bent to catch any sound, their lips set, and a revolver was dangling from each hand.

A stone fell at the entrance to the passage and rolled to father's feet. He glanced at it, but made no movement. Was the enemy tempting us to expose our presence?

We listened in vain for a sound to indicate that they were toiling over the rocks. Then a voice came to us. It was Tsing Lao, and the high pitch and comparative faintness of the tones told us that he was shouting from a safe distance

"Mr. Warren," he said, "we know that you are here and we do not come to harm you. Come forth that I may prove we wish to protect you."

Father and Edward stood motionless. They did not even exchange glances.

"Hear me," Tsing resumed after a pause, "and know that we followed you to the Great Wall. We know where you climbed over, for we saw crumbs where you had eaten. We have searched everywhere for you, I and my two friends, and not finding you elsewhere, we know that you are here. You think we wish to kill you. That is not so. It might have been once, but not now.

"We shall be glad to let you go in peace, we will even guard you to the great city, if the powerful young stranger who is with you will return to me the token that he tore from my neck last night. It can be of no use to him; it is valuable to me. Let me have it and you shall be protected."

I held the badge toward father with a look of inquiry. He shook his head emphatically and looked at Edward, who also shook his head.

The trick was too palpable. We might believe that Tsing had the extremest need of the badge, but it would be worse than suicidal to trust ourselves to his protection.

We returned no answer, and a long,

long pause ensued. It was impossible to believe that they would retire without satisfying themselves as to our presence in the cave.

They knew that we had firearms, and that we would use them. Each of us felt apprehension grow lest Chinese duplicity should prevail, though how they could come upon us without giving us opportunity to inflict damage we could not imagine.

The place seemed well arranged for defense. Two good marksmen, it seemed, could hold the enemy at bay as long as ammunition lasted. Abandoning the place, even if the enemy should not show for hours, was not to be considered, for on the bare mountainside, or in the valley, we were morally certain to be overwhelmed no matter how energetically we fought.

We remained speechless and silent until the suspense became unbearable. The perspiration was rolling down the cheeks of both men when Edward whispered:

"I can endure it no longer. I must crawl forward and see."

"Yes," returned father, "let's have an end of it."

Immediately Edward lay down and wriggled along the passage. We three stood back and watched breathlessly. Of a sudden we saw him extend his arm, and the first shot in our battle was fired.

He stood up then, looked a moment down the slope, and returned to us, an expression of unutterable disgust upon his face.

"I shot a man of straw," he said.

"Literally?" asked father.

"Yes. Go out and see for yourself."

Just then a discordant chorus rolled up from far down the slope. We listened a moment without stirring. The enemy had been waiting for our demonstration among the trees below, and their cries were of triumph.

"Clever fellows," sneered Edward, "and they fooled me. I saw the hat and blouse of a Chinese sitting on a rock within easy range. I hit him. I know that, for the ball dislodged his hat. It fell off the stick on which it was perched."

We went far enough along the passage to see what he had described: a crossed stick had been propped among the rocks and a blouse hung over it so that, with the hat on, it would present the appearance of a Chinese seated on watch.

But at the bottom of the slope we saw Chinese issuing from the forest. They were brandishing scythes and sickles, knives, and long-handled forks, and were yelling themselves into a frenzy. I could not repress a shudder, contemplating what would happen if they should overcome our resistance, and I thought with desperate gratitude of the vial, Edward's dreadful, yet welcome gift.

"They seem to know that it's going to be death to somebody," muttered Edward

I looked for Tsing Lao, supposing that he would be to the fore, urging his comrades on, but I could not see him. Perhaps, like a prudent general, he kept himself out of harm's way

"Maybe," said father in response to Edward, "but the yelling and other wild manifestations are characteristic of the fanatical mob."

I took my position, as father directed, to stand at the rear with mother and load the revolvers as the two men passed them back to us.

The tremors of suspense were gone and my blood leaped with excitement even though I dreaded the outcome. So many were the enemy, and so fanatical and frenzied, that it seemed as if they must keep pushing on until our ammunition should be exhausted, or until there came an unequal hand to hand struggle at the entrance to the cave.

I looked at mother and marveled at her composure. Her face was pale, but her expression divinely calm.

"Hold your fire, Ned," said father, "until you can be sure of your mark. It will be bad for us if our first shots are wasted."

"I will wait for you to give the word, sir."

"Very well, and in picking your men, keep your line of fire to the right of the center. I will attend to the left."

The demoniacal yelling grew steadily louder, but the assault was necessarily slow because of the steepness and roughness of the slope — elements greatly in our favor.

We stood in full view of the ap-

proaching Boxers, and I wondered what they thought of us. I presume our inaction inspired them with greater frenzy and courage, for they made the more haste the nearer they came.

I was beginning to fear that we were reserving our fire so long that they would gain an impetus that could not be checked, when father turned to Edward, a glitter like steel in his calm, blue eyes.

"Will it be good practise now, Ned?" he asked

"Yes," said Edward, in the same quiet way. "I think I can make my target now. I will take that bareheaded man in my division, if you like."

"As you please, my boy," and father raised his arm.

Almost simultaneously the two revolvers flashed. Howling and shrieking went up from the yellow-faced horde! Their savage cries heretofore had had something sadly suggestive of the human in them; now it was as if the fiends of hell had been let loose!

"I made it!" exclaimed Edward

"And I, too," said father. "Steady now; make every one of the chambers tell."

They fired again and again until each had emptied his first weapon, when they flung the smoking revolvers behind them and went to work with the second pair.

Hastily I caught up the cast-off weapons and handed them to mother.

"You must let me know in time, dear," she said, "if the resistance is hopeless," and taking the revolvers I brought she gave me two others ready for use.

"I will," I answered, choking with excitement and a great rush of anxious love for her.

Just as father and Edward opened fire with the second battery of revolvers the entire company of Boxers turned and, in disorderly retreat, dashed down the rugged mountainside! The fatal accuracy of our fire had been too much for their undisciplined fury. Amazed and panic-stricken, they went tumbling over the rocks, and I could not perceive any attempt on the part of their leaders to rally them.

"Victory! Victory!" I cried.

Edward's eyes glowed with excitement and jubilation, but father was very grave.

"It is only the beginning," he said, "a good beginning; but the next trial will be more severe. They can be more persistent, but we can pick them off as fast as they come."

CHAPTER IX.

Entombed.

FATHER returned to the cave and stretched himself on the floor.

"I am tired," he said to mother; "it isn't the physical strain of last night's journey. There was more nerve exhaustion in that five-minute skirmish than in a dozen nights of hard work. But I shall be over it in a minute. I merely want a little breathing spell."

I looked doubtfully at Edward.

"Suppose father's strength should collapse?" I said.

"It won't," he answered confidently; "he's a wise man to rest when he has opportunity. But if he should give way, you and I could make a good fight of it, Jannie."

Edward and I watched until the last of the retreating Boxers disappeared among the trees at the foot of the slope. Some of them were evidently wounded, as they walked with the assistance of others.

"Better go in, Jannie," said Edward; "there is nothing that you can do here. There may be a good deal for me."

"Do you suppose any of them are still alive?" I whispered.

"No, they have made neither sound nor movement since the firing stopped, but I will be sure of it. I have no mawkish sentiment about these fellows, but I would not deliberately let even a Boxer suffer."

"What could you do for them?"

"Nothing more than bind up their wounds, I fear, and I'm no surgeon at that."

I hesitated a moment and then entered the cave saying: "I hope they have taken all their wounded with them."

"What is Ned doing?" asked father, sitting up.

"I do not know, but he said there might be much to do. I think he is going to see if there are any wounded left on the slope."

"He must not!" cried father, spring-

ing to his feet. "Ned! Ned!" he called; "come back!"

"Can you not rest?" mother began pleadingly.

"I do not need to," he interrupted. "It was merely a momentary reaction It has passed and will not occur again," and he went out, still calling to Edward.

Mother started to follow, but I begged her to remain within.

"Why should you distress your eyes by what is to be seen there?" I urged. "Edward has told me I can do nothing. Spare yourself what horrors you can, mother."

"But there may be danger still," she answered, hesitating; "your father was much disturbed."

"Then let me see what is the matter. I will tell you all you need to know."

She yielded to my insistence and I went out again to the far end of the passage. Father and Edward were a few paces below me on the broken rocks that had formed so difficult a pathway for our assailants.

"You mustn't risk it," father was saying. "These fellows might feign death for the very purpose of drawing you near enough for a sudden fatal blow."

"I hadn't entirely overlooked that," Edward replied, "and my motives are not, strictly speaking, those of humanity I'm not so much interested in the possibly wounded as I am in ourselves. I have an idea that our victims may be of use to us when the next attack comes."

"When do you expect it?" asked father.

"After dark. It is now nearly sunset, so we shall not have long to wait. They will reason that we cannot shoot with such accuracy in the dark."

"That has occurred to me," said father desperately, "and what we are going to do about it is more than I have been able to discover."

"In the darkness," continued Edward coolly, "they might make such a rush, coming not only from the center, but along the sides toward the cave, so that we could not see our targets until there were too many close at hand to make it possible for us to dispose of them. The only way I can see to prevent that is to illuminate the scene. There are no trees so near that we can get at them and return with fagots before the enemy could make another assault."

"I begin to see," said father. "All their weapons have wooden handles."

"That's the idea. Now won't it be worth some risk to obtain them?"

"It will, but we must go together. I can prevent a treacherous blow while you are gathering up the weapons."

My heart stood still as I saw them approach the first outstretched body of a Boxer. It was he of the bare head whom Edward had picked as his first target. In that instance they hesitated little before going close to him, for even had he been alive he could not have reached the three-pronged fork that had been his weapon. It had dropped from his hands and rolled several feet away. Edward picked it up and they went on.

It proved that not one of those left upon the field was alive. There were eleven of them. We obtained not only their weapons, but in some cases rude wooden shields, so that when all the loot of the conflict had been gathered, there was material that promised a considerable blaze.

"The question is, how long will it last?" said Edward, a bit dubiously.

"We mustn't start it," father responded, "until the last moment."

There was an anxious discussion between father and Edward as to where the fire should be laid, and while they were settling that point and breaking up the weapons, mother and I prepared the best supper we could from our stock of provisions. For the first time we were struck by the diminishing quantity, and we realized the necessity of limiting the consumption.

The eastern slope of the mountain, where we were, was then in rapidly deepening shadow. There had been no sign or sound of the Boxers since their retreat. We inferred that they were waiting to see if we would be foolhardy enough to venture to resume our journey.

The men had decided that the fire should be built on the rising wall of the entrance to the cave, a few feet back of the place where they would stand while shooting.

The reason for this location is obvious if you consider how difficult it is to

see a person on the other side of a lighted lamp. As the blaze could not be put behind the enemy, the next best thing was to put it behind ourselves.

About on a level with my head, then, and where I could light it while attending to my duties as "powder monkey," was the heap of broken handles and shields. Not all the wood was to be consumed at once. Quite half the quantity was stacked in the passage to be used in replenishing the flame. There was a liberal supply of whittled shavings

Three hours is a long time to wait for a conflict that might mean death! We sat on the rocks at the entrance to the cave, seldom referring to our critical situation save as occasionally one of us would wonder if the Boxers had really left the vicinity disheartened at the result of the afternoon's skirmish.

The forest line was indistinguishable from the rest of the valley. The first intimation we had of the approach of the enemy was a loose stone that was hurled far down the slope. The sound it made could have but one significance. The men stood up at once.

Mother stretched out her arms to father. They embraced silently. Then she kissed Edward and went into the cave. I took the same position I had occupied in the afternoon

Edward during this was peering into the darkness.

"No use wishing for moonlight," he muttered. "I think I can make a target even as it is as far as I can pretend to shoot."

"We'll not have the fire at first," said father.

The Chinese were doing their best to approach stealthily, but they found it impossible to avoid stumbling upon the rough way. We heard them long before we saw them, but they must have supposed that their slips and falls were inaudible to us, for they did not make any other noise until we opened fire.

That occurred when a dozen or more shadowy forms were seen groping along at our right hand and a bit below us.

"We'll both tackle that squad," said father.

Whether they made good practise we could not see, but they loosed the restraints under which the Boxers had been ascending. Their long, pent-up fury broke forth in a stupendous yell that stretched from right to left until it seemed that the whole mountainside was covered by them.

"They've learned not to come in a body," said Edward, continuing his fire at the squad on the right.

"Don't waste a ball, and don't forget the center," father responded, as he gave his attention to the shadows that were cropping out on the left

The shooting at first certainly was more rapid than it had been in the afternoon, and that it was noticeably effective was manifest in cries of command, some of which we could distinguish. Apparently those of the enemy who were near the victims of our fire were inclined to waver. On the other hand, those who could not see what effect the shots had were pressing on, shrieking and brandishing their crude weapons

I was just coming from the cave with freshly loaded revolvers, which mother anxiously said she had great difficulty in preparing on account of the darkness, when father exclaimed

"The blaze, Janet! Quick! We must make them see that they are being killed right and left."

I touched a match to the shavings and soon the flame rose.

I was eagerly watching it ignite the sticks of wood when something sung and whizzed above my head. It struck the rock over the very mouth of the cave and fell in the passage behind me.

Turning hastily, by the light of our growing fire I saw that it was an arrow!

The discovery that our foes were armed with repeating rifles could hardly have been more startling. Here, besides strategy, was a reason why they had delayed the attack so long. They had impressed a company of archers into their service.

"Our blaze has given them their range!" exclaimed Edward

"No," father answered, "that arrow was shot before the blaze appeared. See! there's another, and it is wide of the mark."

We heard the second arrow fall

"We must pick off the archers," father added, stepping back two paces. "Back a bit, Ned. We can conceal all but our heads and shoulders and still have the benefit of the blaze."

They fired from within the passage instead of from the far end.

The maneuver merely decreased the danger, however. We heard the thuds of other arrows before we located the archers, and, meantime, the rest of the assailants were redoubling their yells and their efforts to come upon us.

"There they are," said father presently, "a little at the left of center. Concentrate on them, Ned, carefully, but as rapidly as possible. We needn't mind the flanks until we've disposed of the archers. They won't be quite fools enough to come charging into range of their own arrows."

At the moment I was too wildly alarmed to observe it, but later the method of the attack appeared clear. The archers were to break our defense by killing or disabling the men, when from each side the others would rush in to destroy the women. While the archers were at work the others were creeping as close as practicable on each flank and shouting like mad to worry the defenders and distract their aim.

During the effort to locate the archers our fire had not slackened perceptibly. Indeed, it went on with a steadiness that had not marked it at first. Then, straight to the center the bullets sped, and I saw form after form topple, reel, and disappear.

The range was short for both parties, but our men, while not pretending to sensational skill as marksmen, were experienced shots, and they were nerved to accuracy as no assailants could be.

For a minute or so the thud of arrows continued, but not one came so near its target as the first one, which had been shot substantially at random in the dark.

The crisis of the battle came after the archers seemed to be disposed of. We could see no more of them, though there were all too many shadowy forms in the center, and no more missiles fell near us.

We hoped that this wiping out of their most effective detachment would cause the rest to break, but their leaders were inciting them, falsely assuring them that the way was now clear.

"Their powder is exhausted," I heard one of the officers cry.

So then we saw them closing in upon both flanks. I piled more wood upon the fire, and in its light mother was able to keep up the supply of loaded weapons. It seemed as if the insane mob was not to be deterred from rushing in upon us.

"Have you an extra revolver, Janet?" my father asked as I came forth with a fresh supply.

"Yes, two," I answered.

"Good! Stand here between Ned and me. We'll all fire from both hands at the same time and keep it up till the last chamber is empty. Take the center, Janet! Ned, stick to the right! Now, all together!"

It was not necessary for the effect intended that all our weapons should speak at once. For the next few seconds it must have seemed to the Boxers that our resources had been trebled. For myself, I never knew a more profound desire than that which inspired me at that moment to make every one of my shots tell.

The force on our left pushed to within a few feet of the passage. One of the men was so close that he hurled a pitchfork at us. It struck with a sharp tang on the rock in front.

"Wife!" called father, "a revol—"

The word was not finished before mother pressed a pair of weapons into his hands.

They were the last we had. She had come out with them when she heard father's command to me. Having delivered them she caught up those that had been thrown down and retired within the cave to reload them

Then the Boxers broke. Those who had thus far escaped our bullets saw comrades falling on all sides. Our blaze revealed to them how sure was death if they approached too close

Shouting with dismay and terror, they again scrambled down the mountain. A second time we were victorious, but I had no jubilation to again utter a cry. The crisis had been too severe.

"Well, what next?" asked Edward, after the last shot had been fired at the retreating shadows.

"We must take turns doing guard, you and I," said father. "It is no business for women."

They drew lots. Father drew the second turn and at once went into the cave to rest. Edward put out the fire, more to save the unconsumed wood for future emergencies than for any other

reason, and took his station at the outer end of the passage

I had had four hours' sleep out of forty, and during the interval I had traversed miles of mountain country on foot and taken part in two battles. The physical strain overcame the echoes of pistol shots that rang in my ears when I lay down and slept.

That I had been unconscious more than two hours was attested when father aroused me by rushing into the cave with a startled cry. The men had divided the night into watches of two hours each. Edward had served his first turn and father was on duty.

Almost simultaneously with father's cry there was a heavy crash at the entrance, so heavy that the cave shook with it.

"What's the matter?" I heard Edward ask sleepily.

At the same moment the now familiar howls of the Boxers resounded from the bottom of the slope.

"Another attack!" I exclaimed.

"They are rolling rocks down from above," said father.

At first we could not comprehend fully the import of this maneuver, but we heard a thumping above our heads, followed by another crash midway in the passage.

"I should have been struck down by the first one," said father, "if I had not heard it coming in time to run in here."

"They mean to bury us alive," said Edward, starting toward the entrance.

"Careful, my boy," warned father; "don't take any risk until we have decided what we can do."

Edward halted, and we could hear the loose stones on the steep slope above us rolling and tumbling down the mountain. Some of them stuck before coming as far as the cave, others were turned aside by obstructions and went crashing harmlessly further down; but from time to time one would keep to its course and add its mass to the heap that was beginning to choke the entrance.

The yelling at the base of the mountain was incessant. It told us how vain it would be to attempt an attack. We might, indeed, dash out into the open without much danger of being hit by the descending stones, for they came at irregular intervals.

But what good could come of it? We could not make our way over the rugged surface with any better success than the Chinese could. If we abandoned our refuge, we did so at the certain peril of stumbling into our foe.

Without the natural defense offered by our situation, the disparity in numbers made a conflict hopeless. The men were agreed to that, but they considered the possibility of a charge up the mountain to drive away the Boxers at work there.

This was an equally vain idea, for the number of descending stones indicated that a great many men were toiling above us, and if we went out to give them battle, the force from below would close in on us eventually.

"They can't be so very far above us," exclaimed Edward; "we can try to drive them off with shots from the entrance."

This was the one feasible plan. At a moment when we could hear no stone descending they stepped into the passage and looked up the slope. The sky had clouded and they could distinguish no forms above them. Nevertheless they fired several shots at random, and as they darted back to avoid a great stone that came leaping at them, we heard cries of derision from above.

"It looks desperate," said father. "It will take a long time to raise a wall in front of us that we cannot surmount."

Slowly and dreadfully the night passed, and at no time was there any cessation in the tumbling of stones, big and little, to cut off our exit. Now and again the men fired in the direction of the cries, which now sounded on all sides of us, but the enemy kept out of sight and range.

Before morning came the barrier slowly rising before the cave had become so high that many a stone, falling against it, bounded backward, and we had to hug the rear wall to avoid them.

At daybreak there was an aperture between the barrier and the top of the entrance large enough for a man to crawl through. We had to sit, chafing at our helplessness, while for an hour we heard the Boxers directly over us toiling patiently to close it.

Finally a large slab was dropped squarely over the last opening. Not

content with that, they piled smaller stones upon it until there could be no human possibility of raising the mass from within.

A faint light entered from tiny chinks, but it was not enough to kindle the slightest ray of hope in our hearts.

The work done, the Boxers set up a furious yelling that endured for several minutes. When it quieted we heard Tsing Lao addressing us.

"Give up the token that the powerful young stranger tore from me," he said, "and we will pull away these stones and escort you in safety to the walls of the great city. Refuse, and we shall leave you here to starve. In time we will remove the stones and taken the token from the stranger's dead body."

"We will stay here," father shouted.

CHAPTER X.

After Edward Gave Up.

TSING was disposed to argue the matter, but father returned no reply to his appeals and threats. Before long the Boxers were silent. Their retreating steps and voices died away and we heard no more of them. How far they went we could only conjecture.

"They've been at work all night," said Edward, "and if they ever rest they must do so now."

"Why shouldn't they?" interposed father. "They have us securely caged."

"We'll see about that," Edward returned with his encouraging accent of determination

He clambered as high as he could upon the rocks that choked the passage.

"Mr. Warren," he said presently, "I can't get up as far here as I would like to. Will you take me on your shoulders?"

Father crossed the cave. There was just sufficient light to distinguish their forms from the black walls that entombed us. Standing on father's shoulders, Edward felt the barrier near the top with his fingers.

"Jannie," said he, "while I was on duty I gathered up a lot more weapons and brought them into the cave. There is a hand harrow, or hoe, there somewhere. It has a very stout and long handle. See if you can find it, please."

"There will be no harm in striking a match," father suggested, and I did so, finding the hoe easily, and perceiving more clearly than ever how thoroughly the work of burying us had been done. I gave the hoe to Edward.

He thrust it into a crevice between the stones and pried.

"I don't make the rock budge a particle," said Edward, "but both our united strength may dislodge it. If we can only stir one we shall be able gradually to force a passage. I am going to hang onto the handle. Do you take hold of my legs and drop your weight. It may bring us both down in a heap, but I guess we can stand that."

Father asked him to say when he was ready.

"Let go!" said Edward, after a moment, and father scrambled from under while Edward dropped to the floor.

"Did you stir it?" father asked.

"I couldn't tell. We must try it again and with more force. Also, I must have some light. When I get up there again, Jannie, strike a match, and keep one burning until the experiment is finished."

"Suppose you let me take a look up there," suggested father; "you may have chosen just the best place to apply your lever, but I'd like to be sure of it."

So father mounted Edward's shoulders and by the light of matches examined the barrier thoroughly.

Before he came down father had wedged the hoe a little more firmly between the stones.

"We can't make it any better," he said. "As soon as you've got your breath we'll try it."

They agreed that Edward should draw himself up to his chin when he had clasped the extreme end of the hoe handle. Then father was to spring into the air and catch Edward around the waist. At that instant Edward would drop the length of his arms. The combined weight of the two, with the added force of the fall, they hoped would dislodge the top stones of the barrier.

When Edward had again mounted father's shoulders and had grasped the lever, he gave the word and I struck a match. Then they effected their experiment just as they had planned it, but, alas, the lever broke.

"Did it budge, Jannie?" cried Edward immediately.

"I couldn't see that it started in the least," said I.

Apparently he was not disheartened, for he went to searching among the enemy's weapons for another lever. He found one, and the experiment was tried again and again with no other result than repeated rough tumbles for himself and father.

At last Edward gave it up and sat down to think.

"What would I not give for a glass of water," said father.

"There are some provisions left," mother responded, "and a very little wine."

"You've done well," he said warmly; "I thought from the portion you gave us for supper that the hamper was exhausted."

"No, with care we can make what there is left last through at least to-day and perhaps to-morrow."

After the pitiable pretense of a breakfast the men discussed the possibility of blasting away the top stones of the barrier. Edward thought we might obtain sufficient powder for a charge by taking some cartridges to pieces and emptying the shells. He promptly abandoned the idea as soon as he had taken account of our ammunition. The two battles had made serious inroads.

"There's enough left for an effective charge," he said, "but we should then be powerless against attack. I'd rather starve here than meet the Boxers without the advantage of firearms."

"We might all be killed anyway," said father, "if we brought off a blast from inside. To say nothing of flying stones, there would be the suffocating fumes if we failed to dislodge the rocks."

"Well," said father, wearily, at last, "there's one feature of the situation out of which we can extract temporary comfort. We can rest in safety. We ought to take advantage of it. The Boxers cannot get at us without removing the barrier they set up, and they can't do that without arousing us."

I lay down beside mother and slept.

"Jannie!" She finally awoke me with a whisper.

"What —" I began.

"Sh!" she warned, her lips close to my ear. "Your father and Edward are still asleep. Let us not disturb them until we know the worst."

"The worst, mother?" I returned, as softly as possible. "What has happened?"

"It may be nothing, but I thought I heard persons moving outside the cave. Their voices—there! do you not hear?"

I was sure of it. A man's voice, but extremely indistinct. I heard another, as if speaking in reply to the first.

"The Boxers have returned!" I whispered. "Shall we arouse father and Edward?"

"I can't think it right to do so until there is something that they can do. The Boxers may go away," replied mother.

"Even so; father would be disturbed if he knew that we had not aroused him."

We were spared the necessity of coming to a decision by the action of the persons outside. Throughout our brief debate their conversation had continued, an almost inaudible murmur. Now their voices were raised suddenly.

"Mr. Warren!" called one.

"Mrs. Warren! Miss Janet!" cried another voice immediately after.

Father and Edward sat up. Before they could have understood what had awakened them, mother and I exclaimed together, "Mr. Leung and Wu!"

"Eh?" said father, "what do you mean?"

"Mr. Wa-a-a-arren!" sounded again from without.

"Ah!" cried father. "Burst your lungs, but make a noise!"

How we obeyed that command! I don't know what we said, if anything. I could utter nothing but a hysterical shriek, but I put all my power into it. Father fired a revolver.

That startled me into silence, and father said:

"Wait a bit now. Listen!"

"We hear you," shouted Mr. Leung, "and if you'll shout once more I think we'll locate you."

Once again we shocked the air of the cave until it did seem as if the barrier ought to give way.

When we stopped our noise and listened we heard not only the murmur of voices in conversation, but, presently,

footsteps apparently upon the barrier itself.

"Now," called Mr. Leung, "do you hear me more distinctly than you did at first?"

"Much," father answered. "You are on the right track now."

"I thought so from the first," said the Chinese. "These rocks here appear as if they had been moved recently, but so do other rocks elsewhere on the mountain. Are you all well? I judge from your voices that all are alive."

"Yes, Mr. Kingdon, my wife, and Janet are with me. We lost our one faithful servant."

"If you mean Wu Chin Foo, he is here, and you owe my presence to him."

"I referred to Zila. You remember her, doubtless?"

"Yes; I am sorry. But about yourselves: are you starved?"

"Oh, no; we have a little food left."

"Then I advise you to eat it at once—that is, if you are hungry, for by the time you are ready for more food I think we shall have these stones sufficiently displaced to pass in as much as you will need."

"You'll find it a hard task, Leung. We've tried in vain to stir the stones from inside."

"Ah! but there are many of us, and we have a few implements that will be useful. You seem to be just about under me now."

"Almost. Pry away anywhere there and you'll make an opening."

"Very well, we'll begin without delay. I had begun to fear that you had been buried too deep for recovery."

"Leung," said father, "the one thing we need most is water. Have a flask ready to pass in as soon as you get an opening."

"There is a jar of water at hand," Leung replied. "We'll have a flask with you in no time."

Then his men began to work. We heard them pitching the smaller stones down the slope. Before very long the light in the cave grew stronger, and father was able to make suggestions by which the removal of the barrier could be expedited

Soon we had a glimpse of blue sky through a hole as large as a man's head, and that glimpse was no more than taken when the hole was darkened to let in a jar of water, which Edward took by resorting to his former device of standing on father's shoulders.

Until the water came we had not thought how hungry we were. Following Leung's suggestion, we fell to and finished all there was in the hamper, and I dare not say how much else that the considerate gentleman handed in as the opening in the barrier grew gradually larger and larger.

At length Mr. Leung himself crawled in and joined us, followed at father's request by Wu Chin Foo. There was a hearty shaking of hands all round and a babel of voices expressing congratulation. Far from being omitted in these agreeable proceedings, our servant, Wu, much to his embarrassment, was made the center of them. He tried to stand on his customary decorum, but we couldn't permit that. We wrung his hands and patted his shoulders until his eyes almost burst with astonishment.

"This young man," said Mr. Leung, "is not in the least appreciative of the situation, are you, Wu?"

"I do not know," he answered, bewildered; "they would have died if you had not brought the soldiers."

"Troops, eh?" said father. "You must tell how you managed that."

"All in good time, Mr. Warren," replied Leung. "This young man's story deserves to be told first."

"That is right!" I cried. "Wu, you're a hero, and you don't seem to have the least idea of it. Come now, tell us all about it. How did you happen to bring Mr. Leung to the right spot?"

"I saw you here," he answered with the utmost simplicity. "I do not understand why you think so much of it. I obeyed Mr. Kingdon as well as I could."

Following Edward's directions, after hiding our boat and scuttling the rest of the fleet, Wu had gone to Chang-tzu-shan, a town on the Pei ho, just south of the Great Wall. Edward had a business correspondent there, a Chinese merchant, to whom Wu took a letter. Through the influence of this merchant and by judicious use of the money that Edward had entrusted to him, Wu had been able to hire horses and an escort. These were to await our arrival *via* the river

As Wu had lost no time by dallying, he had these arrangements completed by early in the forenoon of the day when we climbed over the Great Wall. As we were not expected until evening, Wu had several hours of idleness on his hands. He was anxious about us, naturally, for before leaving Shanshan he had become satisfied that our house would be attacked.

Boxers had made themselves manifest in Chang-tzu-shan, as elsewhere, and Wu set himself to watching them and making shrewd inquiries. Before the day was over he heard vague stories of four foreigners who had escaped from Shanshan and taken to the mountains. He observed that excitement grew among the Boxers of the town, and when, toward evening, a party of them, including a number of archers, set forth westward, he followed them, leaving word with the hired escort to look out for us if by any improbable chance it should prove that his surmises were incorrect.

Owing to the lack of anything like army discipline in the Boxer organization, Wu was able to get as far as the base of the mountain undetected. There he saw Tsing Lao, and he took the greatest care to escape observation. He succeeded in this, or we should not have been rescued, for there is no shadow of doubt that if Tsing had seen Wu, the boy would have been put to death.

By that time the afternoon skirmish had been fought, and Wu, keeping out of Tsing's way, had small difficulty in realizing its nature and outcome. His anxiety may be imagined when he saw more and more Boxers arrive during the early evening, and observed their preparations for a stealthy assault.

When the advance was made he again followed and watched the entire combat, doubtless frantically eager to help us.

Wu recognized father by the light of our fire. When the Boxers broke he retreated after a vain attempt to work his way to us. It was well that he failed. It was with no little difficulty that the leaders kept the Boxers together after the defeat.

Wu lingered until he saw this plan in actual operation. Then, not knowing what else to do, he did the very best thing possible. He hastened across the country as fast as his indefatigable legs would take him to inform Mr. Leung of the situation.

He arrived at Mr. Leung's not long after daybreak. A squad of imperial troops was there. They were preparing to return to Peking, for Mr. Leung could discover no trace of us. Wu had only to tell what he knew to bring about a forced march to our burial-place.

"I think," said Mr. Leung, when we had extracted the last possible detail from Wu, "that what little I have to tell should be told *en route* to Peking. It is now quite noon, and I have the use of the troops only until this evening. The situation generally is very sensitive, and we must avoid arousing the least criticism from the government."

"We are all agreeable to that, I'm sure," father responded, "but have you seen nothing of the Boxers since your arrival in this vicinity?"

"I saw two or three fellows skulking about in the forest below. Doubtless they were spies of the band that attacked you, but we cannot permit our movements to be shaped by them. I fear that all North China will soon be in revolt, but it has not quite come to that as yet. The Boxers still have a wholesome respect for the imperial forces. I doubt very much if we are molested on the way, and if we are, we shall be strong enough to fight our way through. We shall be in Peking by sunset."

CHAPTER XI.

No Safety in the Capital.

THE day after our arrival in Peking father advised Edward to call on the American minister and discuss the situation. Edward needed no urging, and shortly after noon he went to the American legation. When he returned we gathered in father's room to hear his report.

"The American minister," said Edward, "is much less hopeful that order will be maintained in Peking than he was when I saw him a few days ago. Every day brings its new developments, and my situation is not the same now that it was then. While passing through Peking on my way to you I was merely a business man asking about matters

generally. Now I am a refugee with other refugees in charge. Then I sought general advice; now I seek protection."

"It hasn't quite come to that, has it?" asked father.

"He so interprets it. Here we are in the capital, and signs of tumult within the walls are multiplying daily. To be brief, the American minister urges us to leave Peking at the earliest possible moment. He says the legation is open to us for such protection as it can afford, but he is agreed with the other foreign ministers here that just how effective that protection may be is extremely problematical. He seems to have lost all confidence in the Tsungli Yamen, and has insisted on the presence of more American soldiers in the capital."

"Are they coming?"

"Yes; but if the mob breaks its restraint in Peking, and if a great proportion of the army sympathizes with the mob, what can a handful of marines do?"

"They can fight."

"And they will fight to the death; but how will that assure us of any security? The presence of every American in Peking at this juncture is simply an added burden to the American minister. We will do him no good, we will do our country no good, we will do ourselves no good by remaining here if we can get away. We are not handicapped as so many of the unfortunate missionaries are who have fled from the country to the legation. We have money and can travel. Let us go to Canton. Boxerism has not affected that province. So long as Li Hung Chang is in control there foreigners will be amply secure of their lives and their interests will be protected."

Mother and I added our pleadings to Edward's arguments. Father reluctantly consented to go to Canton. It was agreed that on the next day Edward should make arrangements for so much of the journey as could be taken by railway—as far as Taku.

"Do you yourself," asked father, in the course of the discussion, "observe evidences of coming trouble as you pass through the streets?"

"Oh, yes," answered Edward indifferently, "but why speak of them?"

I looked reproachfully at him and reminded him that we were not to keep one another in the dark as to any developments, no matter how alarming. Father, too, insisted that he give us his experiences in detail.

"Well," he said then, "lest you be more alarmed by my silence, I will confess that the loafers on the streets make it unpleasant for a foreigner to take a stroll. They have a very uncomfortable way of crowding close to a man, getting in his way, jostling him, and by various petty devices seeking to arouse his temper. I get along with that pretty well, though. I make a joke of it and chaff the rascals good-humoredly. Probably if I showed any sign of fight they'd make it hot for me."

"You must be discreet, Edward," said mother.

"Trust me for that," he replied. "My anxiety to get away from Peking is too great for me to undertake a battle here. Four of us couldn't do as well in the streets as we did on the mountain. By the way, I saw one thing that will interest you. I had to wait my turn to see the American minister. Ahead of me was a mighty mandarin. I was informed that he was Yuseng Chang Ho."

"The one to whom we owe our escort!" I exclaimed.

"It's right enough to feel a certain gratitude to Yuseng," he said, "but I fancy he's been well paid."

"Yuseng taxed Leung heavily, did he?" asked Edward.

"I don't know the amount," father answered, "for Leung wouldn't tell me. Leung is the squarest man in all China. He said we'd settle it after the troubles are over."

"I took it for granted that money passed," said Edward, "and yet I felt grateful to the mandarin and would have made myself known to him if it hadn't been for the awful barrier of Chinese etiquette and the fact that there was no real opportunity. However, he must have learned who I was, for a couple of his numerous attendants were near the legation when I came away and they followed me here. I saw them because I had to turn so many times through being annoyed by the loafers, and I could see that Yuseng's servants interfered in my behalf."

"Yuseng may be a better sort of man that I had supposed," said father, surprised.

Our second night's experience in Peking was not as reassuring as the first. We were aroused by a commotion in Edward's room. Mother and I, apprehensive of the worst, dressed hastily. We heard Mr. Toyi's voice giving directions to the servants, and soon after, Edward making some sort of explanation.

Then Mr. Toyi called to us that we need not be alarmed; it was nothing more serious than a burglar who had unhappily succeeded in escaping. Father asked that the details be told to him and all of us. So Edward and Mr. Toyi came in a few minutes to father's room.

"I was awakened," said Edward, "by the noise of somebody climbing in at my window. He managed it by mounting the outside wall and leaping into a tree, whence he got to my window by a limb. He got out the same way. I let him get well into the room before I made a move, for I wanted to capture him, and feared that if I started too soon he'd get out of the window again.

"I waited until he was beginning to go through my clothes. Then I jumped on him. The fellow was wholly nude and his body had been oiled. It was twice as bad as trying to handle an eel. He simply slipped through my fingers, and I could get no grip on him except by his pig tail. I had to let go of that in a hurry because it was stuck full of needles that pricked my hands abominably."

"It is the regular way with Chinese burglars, as doubtless you know," said Mr. Toyi. "I am sorry for the occurrence, sorry that Mr. Kingdon could not hold the fellow, but there is no occasion for anxiety, as the matter cannot be in any way connected with the general troubles that beset you."

We chatted about the episode a few minutes and then bade each other good night again. Edward lingered a moment after Mr. Toyi had gone.

"I don't see," he said, "that it need make us any more anxious, but the fact is that my burglar was Tsing Lao. I got a good look at his face when we were struggling near the window."

"Ah!" I cried, "it is that dreadful badge that he wants. Why not give it to him and be done with his persistent attacks?"

"I doubt if it would save us a particle of trouble," Edward responded, "but even so, how are we to do it? No, Jannie, the only lesson to learn from this experience is the one we have already learned—we must leave Peking."

I was far from reassured by his evident calmness, but as in other instances that had preceded, there was nothing to do but accept the facts as they were and not permit them to worry the mind into useless panic. So I controlled my apprehensions as best I could and when morning came I was eager to have Edward go forth to make arrangements for our journey, never doubting that it would be no more than to book our places in a certain train.

Edward did not return by noon, and as the afternoon dragged by I grew painfully nervous. Toward evening I sought Mr. Toyi to ask him if he could account for Edward's absence.

"I fear he finds that train service is very irregular," replied Mr. Toyi gravely. "I have myself heard so, and there may be difficulty in gaining the permission of the government to leave the city by train. Mr. Kingdon may be occupied in obtaining the necessary passports."

"Would he not have to apply for them at or through the American legation?" I asked.

"Undoubtedly," said Mr. Toyi.

"Then will you kindly send a servant to the legation with a note from me to Mr. Kingdon?"

I did not like to confess that my sole reason for sending the messenger was to learn whether Edward had been at the legation during the day.

"Miss Warren," answered Mr. Toyi hesitatingly, "I have already sent to the legation, for I wish very much to see Mr. Kingdon. He has not been there to-day."

My heart sank. "Mr. Toyi," I gasped, "there is more in this than you tell me. Speak, I beg! What has happened to Mr. Kingdon?"

"I do not know that anything has happened," he said, greatly distressed, "but I confess to grave fears. Let us talk with your father"

We went to father's room and there, with much embarrassment, Mr. Toyi confessed that he found himself unable to assure us of the safety he had promised through Mr. Leung. He did not put it quite as baldly as that, but the meaning was only too clear.

"I have had a warning from the Boxers," he said, "to turn the foreigners out of my house. I shall not do so, but I fear that the consequences will be most unhappy.

"I should like to lay the matter before Mr. Kingdon, and I have been hoping for your sakes that he would return with word that railway transportation had been obtained. I do not think it is possible. The air is full of rumors I have heard that the government has forbidden all foreigners the privileges of the railroad, and there is well-authenticated information that some of the railway stations between here and Tien Tsin have been destroyed and portions of the tracks torn up."

"We must wait for Mr. Kingdon He will doubtless be here in the evening," said father.

Night came, but no Edward and no word from him. Mr. Toyi sent his servants in various directions to make inquiries. He went in person to the railroad offices where Edward must have made his application. He had not been at any of the places to which we sent.

CHAPTER XII.

I Make a Discovery.

BY morning I was more nearly dispossessed of my reason than I had been at any time since the flight from Shanshan. I had not slept, I had not been to bed. Every sound in the street had held my attention until it ceased. I repelled my mother's attempts to comfort me.

At last, with a great wrench of my will, I told myself that the one thing I must not do was to lose the faculty of clear thought, and I tried to take an example from Edward in meeting the emergency. So, at sunrise, I sat before an open window, going over the situation with methodical exactness, trying first to understand it from every point of view, and, second, to see what might be done.

With regard to the first, I perceived not only that if Edward did not return we were lost, but that the fact that he had not returned or sent word was assurance that he would not do so.

There was no organized police upon whom we could call for assistance. We could not even send out what the American police call an "alarm." There was no way of gaining the cooperation of the community in search for the missing man. The only tenable inference from his disappearance was that he had been detained somewhere against his will.

Coming to the second point, I found it unmistakably clear that if anything could be done it must be done without the slightest delay. I felt guilty that we had risked Edward's life by waiting.

Father was incapacitated. Mr. Toyi was unnerved. The Chinese gentleman might indeed continue his inquiries, but it was not to be expected that he would take great personal risks. Therefore I must make the effort myself.

Remembering Edward's account of the strain upon the American minister, I perceived the futility of appealing to the legation. Our minister and all the ministers in Peking acting in concert were not able to get satisfactory assurances from the Tsungli Yamen concerning the protection of foreigners; what, then, could be hoped from an appeal to one overburdened legation in behalf of one individual?

Eliminating, then, the one agency to which my fellow countrymen and women might appeal, what was there left?

Yuseng Chang Ho! He had befriended us once; why might he not do so again? That he had been paid exorbitantly for his favor was on the whole encouraging. We could pay him again. Moreover, had he not manifested continued interest in us by sending his servants as a quiet escort to Edward?

But what could the mandarin do?

This was a question I could not answer. I felt merely that he was a man of influence, and that through him some manner of energetic efforts might be incited a search if nothing more. It occurred to me, too, that the arrest of a foreigner at such a time as this was not unthinkable.

How to gain an audience with Yuseng Chang Ho was the next problem. I felt equal to breaking down the barriers of Chinese etiquette if once I could get within speaking distance of the mandarin. Again, under ordinary circumstances, this might not have been a difficult, certainly not a perilous matter. Now it was difficult to see how to manage so commonplace a thing as going through the streets to the mandarin's house. That was the most difficult part of my problem.

The ordinary means adopted by foreign women for traversing the streets of Peking, or any Chinese city, is the palanquin, a contrivance like a small coupé without wheels. It is carried by poles on the shoulders of men

I would dare anything under the circumstances, but would it not be risking the success of my mission to trust to carriers?

Emphatically yes; and it would be risking success to venture on the streets when the very sight of a foreigner was enough to inflame the numerous fanatics to violence.

The household was beginning to stir. I went to father's room.

"There is no word from Edward," I said, "but Yuseng may help us find him. I am going to see Yuseng."

Mother looked as if she thought I had gone mad. Father simply asked "How?" adding something to the effect that it was impossible for a foreign woman to go through the streets at this time.

"It is not a question of safety," he said, "but of possibility."

"I know that," I said, "and I am not going as a woman or a foreigner. I shall go as a Chinese boy."

"Janet!" exclaimed mother, horrified not at the thought of donning masculine attire, but at my stupendous audacity

Rapidly I went over my reasons for wishing to see Yuseng, and without pausing for breath or letting them interrupt me, I pointed out how all considerations of affection and gratitude impelled us to do anything possible for Edward's relief.

"Don't tell me how vain the undertaking is," I concluded, "but admit that it is right. Then I shall go with a better heart, but go I shall in any case!"

Mother looked beseechingly at father.

"Jannie is right," he said slowly. "She can accomplish as much if not more than I could if I were so that I could get about. I believe, too, that she will be able to go about with more freedom and less danger than a man could. The disguise should not be a difficult matter to manage."

"The easiest part of it all," I interposed eagerly, rejoiced that he sanctioned my venture, "I can braid my hair into a very respectable cue for a young man."

"We owe everything to Ned," father continued thoughtfully, "and while I cannot hope for results that will rejoice us, we shall have the satisfaction of having done all that could be done. Jannie is right. We must let her go."

Mother sighed resignedly. "If it must be," she said; "but can't you take Wu with you?"

"I had thought of borrowing his clothes," I answered.

"That needn't be necessary," said father. "Toyi should be able to supply you with a costume, and I see no reason why you should not take Wu along."

"Will it be well to let Mr. Toyi know about it?" I asked.

"We cannot well avoid it. His timidity is natural, justified, and to be respected, but I have confidence in his loyalty. We will not tell him that you are going to Yuseng; simply that you are going out. I will get from him directions to Yuseng's house without letting him know, if I can help it, that your errand is there."

"Why cannot Toyi go to Yuseng?" asked mother.

"He can," I replied at once. "I have thought it all out. Let Mr. Toyi go if he is so minded. I can accomplish more than he can by going alone."

"You are strangely confident, Jannie."

"That is because I have faith in the courtesy of the mandarin. Men of his rank are trained to courtesy. They are highly educated, else they would not be mandarins."

I put my arms around mother and kissed her. She held me close, having one last, feeble suggestion to deter me

"You can make your hair into a cue," she said, "but how can you in-

vent a shaved scalp? You don't intend to sacrifice your forehead, do you?"

"How quickly I would!" I cried, "if it were necessary, but it is not. I can wear a hat."

Before long mother brought me the garments I was to don. I put them on with all possible speed. I was eager not to lose a minute.

The blouse was so long that I felt almost as if I were in familiar skirts when I was dressed. I could not doubt that I should be able to go unquestioned anywhere that a native could go, and I trusted to my thorough knowledge of the northern dialect, which I had learned with the readiness of a child, to pass any examination that could reasonably be anticipated. The one thing to fear, it seemed to me, was a street riot or some other confusion that might displace my hat. That article was included in the costume, and it was just what I wanted.

While I was making this change of costume I made a most astonishing and significant, if not alarming, discovery. I came across Tsing Lao's badge. Wondering whether it might be of any service to me during the adventure, I was toying with it when, just how I did not fully see, it split in two pieces.

There were then in my hand not one rectangular piece of metal, but two very thin ones, and each was thinner in the middle that at the edges. The badge was, therefore, a tiny casket, and in the hollow between the plates was a folded paper.

Marveling much, and beginning to perceive why Tsing had set such store on the "token," I spread the paper upon a table and read the words. Some were strange to me, cabalistic, apparently, as were a portion of the words scratched on the face of the badge, but there were enough of them in comprehensible Chinese and grammatical connection to make it clear that this was a document of importance to the Boxers.

It conveyed instructions for their propaganda of destruction, and it had the sanction of men high in the affairs of State, particularly of one from whom it emanated and whose name appeared upon it.

That man was Yuseng Chang Ho!

Here was unquestionable proof of not only the hostility of Yuseng to foreigners like ourselves, but of his treachery to his government; for the document was a plain incitement to revolt. And it was to Yuseng that I was going for aid!

I was so overwhelmed by this discovery that I allowed several minutes to pass while I was considering its bearing upon our situation and my undertaking.

Yuseng had been influential, at least, in procuring us an escort with all the necessary protection that that implied. He had been bribed to do so. Did he have a further motive in bringing us safely to the capital that he might be sure of his prey?

Was that apparently friendly following of Edward by Yuseng's servants but a bit of detective work to discover just where we were located?

I could not understand it; neither could I see that it should change my course. Rather was it the more imperative that I should go straight to this man, powerful not only in the government to which he was a traitor, but among the rebels themselves.

If Edward had fallen into the hands of the Boxers, the one person who could help him, if any one could, was Yuseng.

So confident was I in this conclusion that I did not dare take my father into my confidence lest he see danger and prevent me from going forth. I refolded the paper, put it between the hollowed sheets of metal, and was about to press them together when the words scratched on the face arrested my attention.

I again unfolded the document and compared the words with which it began and the words inscribed on the metal. They were almost precisely similar, the one dissimilarity being extremely slight so far as the formation of a word went, but very great when the meaning of the two forms was taken into account.

The inscription on the metal consisted of two lines, of which the first was made up of a compound that may be written in Roman characters thus:

"Tienchu-li-jin."

A Chinese etymologist might derive a meaning from this; I could not find one that satisfied me. Taken by itself, "Tienchu" was the name a Chinese deity worshiped before the Christian era; it might be translated "Lord of Heaven."

Of the other syllables, "li" has various significations according to its relations with other words, and "jin" means man. The point that struck me as important was the fact that the document began with the same compound.

The next few words in the document were a copy of those upon the metal, with the exception that where "Huan" occurred on the latter, "Hien" was in the former. Using either of these words, the formed sentence seemed to me nothing more than mystic gibberish, but there could be no doubt that the Boxers attached to it some sort of meaning.

I puzzled over it until the words were burned into my memory, but without coming to a satisfactory conclusion as to their significance, and then, feeling that I had wasted precious time, I again folded the document carefully and placed it between the metal plates. I pressed them hard together and they held

Try as I would, I could not get them apart or distinguish the line of cleavage. It was a most ingenious contrivance, thoroughly Chinese in its simplicity and niceness.

Then followed a parting from my father and mother so fraught with anguish that I made it as short as possible lest my resolution give way, and, accompanied by Wu, I set forth from Mr. Toyi's house.

CHAPTER XIII.

The Password.

I OWN to no little trepidation as we emerged from the gateway. The hat concealed almost the whole of my face, my cue was a perfect fit, and I could not doubt that the costume would enable me to pass unnoticed in a throng; but there was the danger of betrayal of my sex by my gait.

Across the street stood a group of idlers who could have no other purpose than to watch the house where foreigners were known to be in hiding.

Long as I had lived in China it struck me that I had never before observed the peculiarities of the Chinese walk. I glanced slyly at Wu and did my best to imitate his movements and general carriage. He stooped and picked up a pebble that he examined with apparent interest. Then he tossed it away with a laugh.

"I thought I had found a jewel," he said.

What he meant by this action I could not tell at first, for I knew that he had not been deceived as to the value of the stone; but when we went on after the slight pause that had ensued, he was on my left hand instead of on the right, and between me and the idlers across the street.

"That was well done, Wu," said I softly.

"I think so," he responded, "and if those fellows are watching they will hardly imagine that we are on a serious errand. If we had gone on hurriedly, now, the way you were starting, they might have been suspicious."

I believe women are credited with an irresistible inclination to look back, but, for my part, remembering the deplorable consequences to Lot's wife after that indiscretion, I went straight on, my curiosity and fear regarding the idlers unsatisfied.

Mr. Toyi lived on a quiet street where there were no shops and but little traffic We soon turned into a very different kind of street, a broad thoroughfare given over wholly to business. The merchants, not content with the rooms they occupied in the buildings, extended their shops clear across the sidewalks, leaving a narrow way for pedestrians where it was impossible for me and Wu to walk side by side.

There was a continuous throng here, and I began to feel easier, for all the persons we met were intent upon their own affairs and paid no attention to the two boys trotting along with apparent serenity

It was a long walk, mainly through busy streets, to Yuseng's house. But for Wu, who had received minute directions from father, I fear I should have lost my way.

We were not molested, and during the greater part of the journey there was no very striking evidence that the city was not enjoying its usual tranquillity. Business appeared to go on at the shops just as usual, and the groups of men might have been seen at any time.

Once only did we see a foreigner, and then but for a moment. I could not make out his nationality, but think it was French. He appeared from a side street a little way ahead of us and was instantly surrounded by a surging crowd that rapidly grew larger.

I remembered Edward's too brief description of his experiences, and wondered if this man would keep his temper.

I was sadly excited, longing to observe the event and wishing at the same time that we could get away from it. The entire neighborhood was in commotion. It seemed that quite as many peaceable folk were trying to avoid being concerned in the disturbance as there were who ran to stimulate it by at least as much as looking on; and we prudently joined the throng that made off hastily in another direction.

This took us out of our way a bit, but before very long we were again on the thoroughfare somewhat above the place where we had seen the foreigner in trouble.

There was no sign that anything had happened, and I never learned whether the episode terminated seriously or not. Small wonder, for it was on that day that rioting first broke out in Peking, and it was not many hours before the adventure of an individual would be lost sight of in the general tumult.

We came upon one other matter of even greater significance: a street where the merchants were hurriedly removing their goods from the sidewalk and stowing them within doors. In not a few places the walk was entirely clear and the shutters up before the windows.

"This is our most direct way," said Wu, "but I don't think we'd better take it."

I agreed with him. Just what the situation in that street and neighborhood was I did not know. When merchants abandoned their business it was sure sign that trouble was at hand. We could not risk finding ourselves in the midst of an aggressive mob, so we made a détour so great that if trouble arose there while we were on our way, it did not come to our ears

At last we came to the entrance to Yuseng's house. A functionary of some kind, not a soldier, as I was glad to note, stood there, and without giving my beating heart time to batter down my courage I went straight up to him and bowed low.

It was not so much that his station demanded humble salutation on my part as that I wished to conceal my face wholly from him.

"May your grandfather and your great-grandfather and all their ancestors be blessed to all eternity," said I.

"What do you want?" he demanded in a surly tone.

"I have a message of the greatest importance for his excellency, Yuseng Chang Ho."

"Give me the message. I will take it to him"

"I cannot. I must give my message to his excellency with my own lips."

"Is it not in writing then?" asked the functionary, and I noted the twang of suspicion in his tone.

"It is not," I admitted, glancing cautiously at him. He was scowling ominously.

"Who sent you?" was his next question.

"That also I must state only to his excellency," I declared firmly, as I slipped a gold piece into his willing hand.

He took my bribe with the utmost readiness and then pushed me aside.

"Get out!" he growled; "no one can go in to his excellency on such flimsy pretext."

"I must see him!" I cried. "It is most important! He would punish you if he knew -"

"Do you want the lash for brawling in front of his excellency's house?" he demanded savagely. "Begone at once, or I will summon the guards."

He gave me another rough push. In my despair I was offering feeble and useless resistance. Wu caught me by the hand and pulled me away.

"Come away, Kung, or we shall both get into trouble," he said in a loud and pleading voice; and, as he yanked me across the street, he added in an undertone: "Don't you see that the gate is about to be opened? Yuseng is coming forth. Then will be your chance to address him if you have the courage. His excellency may order your arrest."

"I wish he would," I answered, "for then I should have the opportunity to speak to him."

"That doesn't follow at all," protested Wu. "I am sorry to interfere, but I am sure I have saved you from being locked up where you would not see the mandarin for a long time, if ever."

"I presume you are quite right, Wu," I responded, "and, in any case, you need not hesitate to interfere until we come into the presence of Yuseng. Then I must have my own way. Do you say the gate is about to be opened?"

"I think so; that is, before long. Let us turn this corner a moment and get out of sight. If the guard at the gate forgets you it will be better. Suppose he should warn the mandarin that an insolent fellow was trying to force his way in? That is how he would put it, and that wouldn't be a good introduction."

Wu's argument was not convincing. I was so inspired by determination to get word of Edward, even if I could not save him, that I was blind to reason and unprepared to take reasonable methods. Nevertheless, so flustered was I by the tussle with the man at the gate, that I suffered Wu to lead me around the corner into an adjoining street.

"Now play that you are an idler," he said, "and I will watch the gate."

I leaned against a wall, tucked my hands in my blouse, as I had seen so many an indolent Chinese do, and stood motionless, looking at the ground. I dared not raise my eyes lest the attention of some shrewd passer be arrested by the shape and color of my face.

Wu, meanwhile, sauntered back and forth, never letting the gate out of view for more than a second at a time.

Nearly half an hour passed. It seemed as if I should die from the suspense when he sidled carelessly up to me and said, "They are opening the gate now and the people in the vicinity are prostrating themselves. We must do the same, you know."

I had forgotten that. In my anxiety to bring myself to the attention of Yuseng, I had thought only of going straight up to him boldly and winning him by sheer audacity.

How was I now to gain his condescending favor, I, ostensibly a mere boy among the many older persons who would be in the way?

"Come," I said desperately, "let us get as near the gate as possible."

The gate was open when I turned the corner and attendants were issuing and making announcement of the coming of the great man. In the street were several persons prostrating themselves in due form.

That Yuseng was a great man, in the way such matters are estimated in Peking, was plain when his conveyance appeared. It was a palanquin carried by four bearers.

I changed my mind about going close to the gate when I saw how many were gathered there awaiting the passing of the great magnate. I feared my identity might be utterly lost among them. So Wu and I knelt in the road near the corner

I was not the only one, it seemed, who had come there hoping for audience with Yuseng. An old man bawled some manner of petition from the group in front of the gate.

"Another time," said one of the attendants loftily. "His excellency cannot hear you now. He is on imperial business."

That, for a moment, was a frightful dash to my hopes and courage

"Imperial business!" a vague phrase, to be sure, but, perhaps, one that really meant all that it was interpreted to mean by the humble petitioner above. It might cover such a commonplace as collection of taxes, which could be postponed; but if it really meant that Yuseng had been summoned to the "forbidden city," that marvelous, trebly walled precinct where dwell the emperor and court, then no plea could be so strong as to cause the mandarin to delay an instant.

"Imperial business!" There might be one matter more pressing for Yuseng Chang Ho than a command from court! Seized as by an inspiration, I called loudly when the palanquin was just before me: "Tienchu-li-jin!"

The curtains of the chair were down, but I saw them disturbed from within. I bowed my head again, not daring to look up and face the mandarin lest the early betrayal of my sex and nationality might destroy my hopes.

I heard a low command, in obedience to which the carriers halted. Then I felt that the magnate was looking at us two prostrated in the road beside him.

"Who spoke?" came in a voice so low and soft that I doubted whether any but Wu and myself could hear it

"*Ngo iao tch ng-la wo ih sing.*" (I have something to say to you) I responded, raising my head a trifle, but not venturing yet to show my face.

A pause followed, only a second or two, though it seemed a minute, so intense was my anxiety, and then the mandarin uttered, still so softly as to speak all but inaudibly, those strange, mystic words that were inscribed on the face of Tsing Lao's badge.

My response was prompt, so prompt and unhesitating that I firmly believe my action was impelled by a power higher than myself. What I said consisted of the first words of the document I have described. They were the same that the mandarin had said to me, with the single exception that where he said "Huan" I said "Hien"

It flashed upon me while I was speaking that the two phrases made a challenge and reply known only to members of the Society of Boxers.

That such was the case and that my substitution of "Hien" for "Huan" in the mandarin's phrase was a satisfactory answer I was certain a moment later, when the mandarin instructed his carriers to turn back

We remained with our heads to the ground while the procession of attendants and the carriers with the chair turned about us.

"His excellency bids you enter," said a man

I recognized the voice as that of the surly functionary at the gate, who had accepted my bribe and pushed me away. He was respectful enough now, and my heart beat high with hope

"I beg your honor to pardon me; I did not know," stammered the functionary. As I arose he made me an offer of the gold piece I had given him.

"Keep it," I said. "I shall say nothing."

CHAPTER XIV.

The Mandarin.

WE were conducted by the wonder-group in front of the gate, several of whom made us respectful salutations as we passed, into the spacious grounds about the mandarin's house.

Just within the doorway we were halted for a moment. One whom I took to be a secretary to Yuseng came from a room at my right and looked inquiringly at us.

"Which is he who addressed his excellency?" he asked

I indicated that I was the one.

"And this other?"

"My servant," said I.

I would have liked to take Wu with me into the presence of the mandarin, but I had gained admission by subterfuge and the deceit could not be kept up much longer even if it were desirable.

It seemed better to begin the business within the house on a straightforward footing and so give Yuseng nothing that eventually he could turn against me.

"His excellency will see you alone," said the secretary

I entered then the mandarin's audience chamber.

Yuseng could not have chosen, if he had tried, an attitude and appearance more calculated to impress himself indelibly on my memory. He was a man of more than average stature. His shaven head gave no indication of his years, but his heavy mustache and goatee were iron-gray.

He wore a long robe of yellow satin, open in front and caught at the waist by a band. A collar of blue silk tapered from his neck to his shoulders. One foot, clad in a black satin boot with a thick white sole, showed beneath the skirt of his robe.

His elbows rested on the arms of his chair, and his head was inclined slightly, the brows wrinkled; everything about him indicated expectant attention. The chair on which he sat was of elegantly carved black teak wood extravagantly inlaid with mother-of-pearl and glistening here and there with costly gems.

"Speak," said Yuseng. "Who are you and from whom do you come?"

I bared my head and stood, hat in hand, looking straight at him.

It is not for me to say what sent the flush to Yuseng's cheeks, what withdrew it as suddenly as it came, what caused the beads to gather on his brow.

He did not change his attitude, but his fingers were pressed hard into his palms.

In spite of manifest effort, his eyes wavered. The mandarin was deeply stirred, and he was exerting himself to the utmost to avoid displaying the fact.

A long silence ensued while he kept his eyes upon me. At length, as if confident that he had himself under control, he spoke again.

"It is still for you to speak," he said; "what is your language?"

"I am an American, your excellency," I answered; "but if you prefer it, I can tell you my business in your own tongue."

I made this response in Chinese.

"Speak English," he commanded, and it crossed my mind that he might prefer that tongue on the ground that possible eavesdroppers would not understand what passed between us.

"Your excellency," said I, "four days ago I was a fugitive from my home in Shanshan, province of Chili. With me were my father, William Reade Warren, my mother, and the man to whom I have given my heart and pledged my hand, Edward Kingdon.

"We were in dreadful straits and should have perished if it had not been for the timely arrival of soldiers sent by your excellency. They brought us safely to the capital. We are deeply grateful to your excellency, and now that again trouble has fallen upon us, we beg you to aid us."

"You have been sent here, then," he interposed, and I thought I detected a feeling of relief in his tone.

"No, your excellency," I responded, "I came wholly of my own motion, although with the knowledge of my people."

"Including Mr. Kingdon?" he demanded sharply.

"No, your excellency. If Mr. Kingdon could have given his assent I should not be here. It is about him that I come. Mr. Kingdon has disappeared!"

"Why do you bring the matter to me? I know nothing about it."

"I come to you, your excellency, because you are a man of power and because I have the best of reasons for believing that you will exercise your power in behalf of an unfortunate foreigner whose greatest desire is to leave this country.

"Oh! sir, do not disregard this appeal! In all Peking you are the only one to whom I can turn with any sort of hope. I did not come supposing that you could give me information about Edward—Mr. Kingdon—but believing that if you said the word a thorough, official search might be made for him

"My father will spare no expense within his means to learn of Mr. Kingdon. He saved us; we wish now to save him, and I am sure that Leung Lo Nieh, who is our friend, would go to great expense also if necessary to save him."

This, you will perceive, was my crude attempt to excite Yuseng's cupidity. I had never tried to bribe a mandarin before, and I all but gasped as I realized how baldly I was putting the offer

He did not seem to be in the least disturbed—that is, by the suggested bribe and his general air of uneasiness disappeared during my speech. He seemed to reflect for a moment what he might feel himself called upon to do

"Tell me, Miss Warren," he said slowly, "when did you see Mr. Kingdon last?"

"Yesterday, at about this hour, sir."

"What! So recently? Come, come, Miss Warren, may not a man be absent for twenty-four hours without all this dismay?"

"Not in Peking at this time."

For the first time since the beginning of the interview Yuseng modified his attitude. He sat back in his chair and clenched his fingers over the carved ends of the arms. His brows were so wrinkled that his eyes almost closed.

"I do not seem to know whether I am awake or dreaming," he said. "I perceive that you are a woman and you say your name is Warren."

"Yes, sir, Janet—"

"Yes, I know your full name," he interrupted, "for you have reminded me that through my intercession with the military commander a detachment was sent to protect just such a party as you describe. Of course I know your name. I could tell you a great many things about yourself that would surprise you that is, if you are the person you represent yourself to be."

"I can bring proofs," I began, startled by this very reasonable suggestion on his part that he might regard me as an impostor. Again he interrupted.

"I will grant for the moment, perhaps permanently, that you are Miss Warren. That you come to me in disguise, in masculine attire, is a matter of American taste, doubtless, that I should not presume to question. I fear, from your blush, that you regard my remarks as thinly veiling an insult. I beg you not to interpret them in that way. I am thinking aloud for your benefit, not my own. If I should keep my thoughts to myself you would be utterly at loss to know how to complete your business with me."

"I thank your excellency," I said, and wanted to say more, but could not. If this revelation of his thoughts was intended to unnerve me, the device almost succeeded.

"I confess," he proceeded suavely, "that I am greatly puzzled. I was quite sure that one of my countrymen addressed me when I was setting forth in my chair. I asked my men to conduct that person to me, and they bring not that individual, but a young American woman. You have suggested that the times are perilous. Do you not owe it to me to inform me how you imposed upon my servants?"

"Oh, sir," I answered, "I did not impose upon them more than on yourself. I was the person, the supposed Chinese, who addressed you."

"Indeed! And will you kindly repeat your form of address?"

"Tienchu li jin, your excellency."

The mandarin hesitated an instant and then spoke the cabalistic words inscribed on the badge, just as he had done while in the chair. Inferring that he wanted me to repeat what I had said, I gave him the opening words of the treasonable document.

Instantly his demeanor changed.

"Young woman," he hissed, leaning far forward in his chair, "who taught you to say that?"

"Nobody, your excellency," I stammered, horribly frightened.

"It was your Mr. Kingdon!" he said sternly.

"No, no, your excellency!" I cried. "Mr. Kingdon never heard the words I used. He did, indeed, see the words you spoke on the face of Tsing Lao's badge."

"Ah!" he exclaimed, in a long-drawn aspirate that quivered with excitement. "Now we are getting at it. So you know something of that badge?"

"I do, your excellency; I know more than any one in our party knows. See, here is the dreadful thing. May I tell you all about it?"

I held the badge toward him and saw his eyes flash eagerly. It seemed as if he were tempted to reach forward and wrest it from me when I would gladly have given it up; as if he realized suddenly his unbecoming loss of self-control.

"Speak," he said harshly; "I will hear all you wish to say."

So then I told him, at first with frantic earnestness and eventually, as he refrained from interruptions, with calmness substantially all my experiences, beginning with the flight from Shanshan. I gave him a full account of Tsing Lao's doings, his repeated demands for the badge, his invasion of Mr. Toyi's house, and my accidental discovery that the article concealed a document from which I had learned the phrase that had served as my password to his presence. Throughout it all I held the badge in my hand.

"Please take it, your excellency," I said at the end; "I have never wanted to keep possession of it," and I held it toward him.

He took it and, keeping his eyes fixed on mine, fingered it until presently the metal plates parted and the folded document was revealed. Slowly he spread the paper upon his knee.

"You read this, I suppose," he remarked.

"Yes, your excellency, but I could not pretend to understand it all."

"Tut, tut, Miss Warren," he said in a gently reproving tone, "don't descend to dissembling. You would not be expected to comprehend the full meaning of every word and phrase, but surely you must have perceived that this document places me in a very peculiar relation to the government I serve."

"It seemed susceptible of that interpretation, sir," I said faintly.

Yuseng smiled grimly and touched a bell. He ordered the servant who responded to bring a lamp. When this had been done and the servant had retired, the mandarin held the paper in the

flame until the last scrap of it had been destroyed. Then he looked tranquilly at me.

"You are a brave young woman, Miss Warren," he said.

"I do not see why you should think so," I responded. "No courage surely is required to call on a gentleman of your excellency's position."

Again the wrinkles almost hid his eyes

"Are you a trained diplomatist," he asked, "or are you merely the ingenuous young woman you seem to be?"

"Sir," I answered, and my lips began to tremble despite the hardest efforts to control them, "I have told nothing but the truth. The unpremeditated subterfuge I employed to gain admission to your presence was my only deceit, for I admitted my sex and name at the first opportunity when I could do so with safety. I have been wholly straightforward with your excellency, and you have not yet given me so much as a hint of your purpose, whether you will interest yourself in behalf of Mr. Kingdon."

The mortifying tears fell and I could go no further.

"Be assured, Miss Warren," said Yuseng, with his most polished suavity, "that I shall interest myself energetically in Mr. Kingdon. I promise nothing more definite than that at present, but I shall try to find him."

"Thank you," I choked.

"Reserve your gratitude," he continued, "until we have considered the subject further. I spoke of your courage. With your admirable cleverness has it not occurred to you to reflect that I cannot permit you to leave this house?"

If there were any real question in his mind as to my ingenuousness, it must have been answered by the look of terror I gave him.

Suddenly I saw my situation in a frightful light.

"I have burned the documentary evidence of my relations with the Boxers," he said calmly. "You see, I can afford to be wholly frank with you, for, first, you know all; second, you are wholly in my power.

"I beg you not to take undue alarm, but it is necessary that you should perceive your exact situation. Think of how little avail it would be to me to destroy that dangerous document and yet permit a young American lady to go forth with full knowledge of what it contained. How could she resist the natural temptation to tell an interesting story of her visit to Yuseng, the mandarin? How could that story, with all its details and many increases from the fancies of various narrators, fail to come to the ears of your minister and, at length, to my superiors in the government?"

Had the situation been less grave I might have collapsed utterly. A moment before I had been on the tearful verge of helplessness, but now the horror that confronted me enabled me to pull myself together.

"Your excellency," I said, "can you not trust me to keep faith with you? We are all anxious to leave Peking. You can see how great a boon you would confer by restoring Mr. Kingdon to me. Do you not see that it would be a slight thing for me to do in recompense to keep your secret?"

"You have referred to me as a gentleman," he answered; "I appreciate the term. I would not for one moment distrust a lady's intentions. I will be more precise and say that you, Miss Warren, inspire me with singular confidence. If it were a question of yourself alone, I would unhesitatingly trust myself to your word. But there are others, your father and mother, and, if we find him, Mr. Kingdon."

"You can trust them as implicitly as you would trust me. Moreover, I will not tell them the secret of the badge"

"They know of its existence," said he. "No, Miss Warren, four persons are a great many to carry a man's fatal secret when they are out of his power."

"You confess that you are afraid," I said, searching my mind for some way to turn his fear to good account.

"I never in my life felt so much alarm," he responded, "as I did at the moment when I perceived that a foreigner had given me my own secret password with the Boxers. I am afraid now to let you return to your people"

Yuseng smiled, as if he imagined that I must take some manner of intellectual delight in his admissions and arguments.

"Your excellency seems to forget," I said, "that I came here with the knowledge of my father. Is there no danger in the inquiries he will institute if you detain me?"

"Miss Warren, it is twenty four hours since Mr. Kingdon left you. From your statement that he has disappeared I infer that you have made inquiries at places where he was expected to go and that you find nobody who saw him after his departure from Toyi Shen's house. Am I right?"

"Yes, your excellency."

"Bearing that in mind, let me ask who saw you enter my house? My servants, who would be questioned vainly in any event, admitted a Chinese youth. Certain strangers before the gate saw a Chinese youth enter. As a Chinese youth you are non-existent, Miss Warren."

"But my father knew that I was disguised: and you forget my servant."

"Is he your servant? Understand me, I trust you to speak the truth."

"Wu Chin Foo has been in our household since he was a little boy, your excellency."

"It simply means, then, that I must detain him also. Be assured, Miss Warren, there are no inquiries that can be instituted in these times that will compel a mandarin to disclose the secrets of his house. It is a long way from here to Toyi Shen's. Even if your father could trace every step of your journey hither—if he could prove that you entered here—it would be impossible for him to prove that you did not go out again. Do you see?"

"I do," I answered sadly. "I am at your mercy."

"That," said he, "is precisely what I wanted you to comprehend and acknowledge. Now, perhaps, we may get on more satisfactorily. I have strong reason for gratitude toward you, Miss Warren, and, as it will be necessary to convince you of this, I shall tell you something further about the badge that you have recovered for me.

"It is one of several issued to trusted leaders in the province. By discreet use of the documents concealed in the badge they were enabled greatly to augment their following. The movement once started, it could be trusted to proceed by its own strength. Therefore, the time came when I had no further need to risk my name and station in connection with the propaganda, and I sought to recall the badges and destroy the documents.

"I got them all in except one, and you can imagine my anxiety, perhaps, when I learned from Tsing Lao that his badge had been torn from him by an American. You have seen me destroy the last credible evidence that I have been concerned in any way with the revolt, the last evidence, Miss Warren, except such information as you might impart. As for Tsing Lao, that bungling rascal shall not give either of us trouble after today."

He struck a bell three times, and almost immediately he whom I have called the secretary entered bearing a small tablet and a stylus. He made a profound obeisance and prepared to write.

"You will summon Tsing Lao," said Yuseng, speaking in Chinese; "I do not wish to see him. Let him quietly be beheaded. I want no trouble about it!" and he struck his hand smartly on the arm of his chair.

"Your excellency's wishes shall be respected," said the secretary, making a memorandum.

"There is in Peking," continued the mandarin, "a certain American who is a merchant in Canton. His name is Edward Kingdon. Until yesterday he was the guest of Toyi Shen in the Tatar city. Interrogate Tsing Lao concerning him. Make other inquiries and bring your information speedily hither."

Yuseng supplemented this command by striking his chair arm twice. The secretary responded as before and withdrew.

"I wish to give you further proof of my gratitude, Miss Warren," said the mandarin. "You have perceived what I will call the political necessity of detaining you and your servant. I assure you that you will be safer here than you could be in any place open to you in Peking.

"Your legation will be presently but feeble shelter against the passions of the people. Toyi Shen's house will be destroyed if he continues to harbor foreigners. You cannot leave the capital at present, for the railroad is destroyed for miles, and the country be-

tween here and the coast swarms with rebels.

"Out of gratitude to you, as well as in recognition of your singular courage, which I admire highly, I offer you and yours the protection of my house. No mob will presume to violate the sacred dwelling of the mandarin, Yuseng Chang Ho."

"Do you mean that you will send for my parents and Mr. Kingdon?" I asked, bewildered for a moment.

"You have heard me institute an inquiry of the most searching character for Mr. Kingdon," he replied, "and I will send for your parents just as soon as you enable me to do so."

"I do not understand. How can I give you more power than you now have?"

"By writing such a note to your father that he will come without hesitation or delay."

"I have put myself wholly in your power," said I, "and now you would have me place my loved ones in the same situation. Thus you would have at your command all those whose information to the government might be dangerous for you."

"There you show yourself again the diplomatist," he responded with at least the semblance of good humor. "I take no offense at your suspicion of my motives, for in diplomacy we are accustomed to being discredited at every turn. I simply recall your attention to the hard facts.

"Here you must stay. If your father and mother remain where they are they are morally certain to be destroyed. I can imagine that it would be more comfortable to you to have them with you."

In my thoughts I passed his statement of the case in rapid review. Nothing could be more lucid, nothing more convincing. I was by no means confident that I could repose any sort of trust in him, but I thought how my father's determined efforts to get trace of me would precipitate violence, and how we had so often in our flight told each other that if the worst came we would die together. If we were together, even in the power of this mandarin, would there not be more chance of ultimate escape that if I endeavored single handed to oppose him?

As I had seemed to be inspired to address him in those mystic words at the gate, so now an inspiration came to me. His demeanor and words had aroused the liveliest hope that Edward was not only alive, but within easy reach. Was it not reasonable to suppose that Edward had been waylaid by Tsing Lao at the direct command of Yuseng in order to get possession of that fateful badge?

"Your excellency," I said firmly, "I must ask you to give me substantial proof that your motives are as humane and hospitable as they appear to be. Produce Mr. Kingdon alive, and I will write as you request to my father."

CHAPTER XV.

No Foreigner Can Survive!

YUSENG assumed the attitude that had so impressed me at first. He looked at me with sharpness and, it seemed, amusement.

"Admirable!" he exclaimed softly. "What if I am unable to meet your condition?"

"In that case," I answered, "I shall not be a willing party to bringing my parents here. I will not write to them."

"Do you forget my power over you?" he asked. "I should dislike to resort to compulsion."

"If you did," said I, "I should resist to the uttermost. That, at all events, would cause delay, and there cannot be a long delay before my father will take action that can cause you annoyance at the least, possibly difficulty, for, as you say, he has knowledge of the existence of the badge."

"It is not a strong argument," said Yuseng, "but I confess that I prefer to have the arrangement I suggested consummated as soon as practicable. You have scored an important point, Miss Warren, and I yield."

He struck his bell three times.

"Your excellency," began the secretary as soon as he entered, "it is learned that Mr. Kingdon—"

"No matter," interrupted Yuseng; "I wish to see him."

The secretary made his obeisance as unemotionally as if his master had asked for a glass of water, and went

out. I was overcome with wonder and delirious anticipation. Was it possible that Edward had been in this house all the time? I turned inquiringly to the mandarin, but he sat looking so thoughtfully at the badge, which he had pressed together, that I could not frame a question.

I had but a moment to wait. Through the same door by which I had entered came Edward!

"Jannie!" he shrieked.

My head was on his shoulder and his arms around me. For one supremely happy moment the agonies of the recent past were forgotten.

We were recalled to a sense of the Chinese proprieties which we were outraging scandalously, and to the situation, little less critical than before, by a cough from Yuseng. Edward kept one arm around me and faced the mandarin.

"Mr. Kingdon," said Yuseng composedly, "the badge concerning which I asked you last evening has been restored to me by Miss Warren. I regret the inconvenience to which you were subjected in my anxiety to learn of it. She is fully cognizant of my reasons for wishing to get possession of the article, and I have placed her on her honor not to disclose those reasons to anybody, not to you, Mr. Kingdon, and I trust you will not distress her by making useless inquiries, for I am confident she will keep faith with me.

"I admire her devotion to you so highly, and I am so grateful for the favor she has done me, that I offer her, yourself, and her parents the shelter of my roof for as long as there is danger for you in Peking. I wish her to send for her parents and she has made her consent conditional upon my producing you alive. I have met the condition and I hope that you will interpose no objection or argument to dissuade her from her promise. You will find writing materials there."

The mandarin pointed to a table, and in the most dignified manner imaginable left the room.

It came over me with a shock of dismay that I must keep my promise. The distrust that I had felt for the mandarin, even while he was heaping flattery upon me and offering hospitality, was amply justified by Edward's appearance.

I perceived the farcical nature of that solemn command to his secretary to institute a search. That deception was now transparent; how much else in his assurances might be equally deceptive?

"Jannie," said Edward, "my joy at seeing you was too great to feel at first the fear that now arises. How did he manage to get possession of you, and in this guise?"

"I will tell you as much as I can," I answered, "but lest he may not allow us sufficient time, let me hear your story first. What happened to you? We made inquiries everywhere."

"I started for the railroad terminal," he replied, "but as I was leaving the house it occurred to me that I might save time by going first to the department of railroads and telegraph for information.

"I thought it advisable to go there in some sort of state, and so looked around for a chair and two. There was one not far from Toyi's house, and the carriers were evidently seeking a patron. I beckoned to them and they brought the chair to the curb. I was stooping to get into it when I was attacked from behind with great violence.

"A cloth or bag was thrown over my head and I was dragged, as I could tell by the feeling, through a gateway. It was all done with extraordinary celerity. One of the ruffians covered my mouth so that I could make no sound, while the others bound my hands and feet. Then a gag was thrust into my mouth, the cloth was wound about me, and I was taken to a cart. Think of it, Jannie, this in broad day!

"Whether the carriers were in collusion with my assailants I do not know; but probably they were, for on previous occasions I had not seen chairs awaiting passengers in that street. It doesn't matter. I expected that I should be borne to the river and thrown in, or that something of the kind would be done to me, but I was brought here, wherever it is, and shut up in a cell underground.

"I had to stay there several hours, doubtless because Yuseng was away when I arrived. During that time I saw nobody and heard nothing. At last a man came who untied me and removed the gag. He led me to a chamber into which some light penetrated through a

grated window near the top of the wall. Some others, evidently underlings, were there, and presently Yuseng came in.

"'So, then,' said he, 'my servants have done better than that bungler, Tsing Lao, with all his trying.'

"Until then I had supposed that Tsing must have had a direct hand in my capture. I perceived, of course, why Yuseng's servants had followed me. It was not to protect me from street loafers, but to make certain where I was staying. I could not think what special purpose Yuseng could have in abducting me until he made a demand for the badge I had torn from Tsing.

"There is no need to go over the conversation in detail. I hadn't the badge, and he wouldn't believe me until I had been thoroughly searched in his presence. Then he wanted to know what I had done with it, and I refused to tell him. You see, Jannie, I feared for you.

"If I had told him that you had the thing, whether he believed me or not, he would have had his ruffians attack you. In fact, he asked me pointblank about each of you, including even your mother. I tried lying to him, but it wouldn't work. 'We threw it away,' said I.

"'Now I am all the more certain that you have it among you,' he answered, 'for if you had thrown it away you would have said so to Tsing Lao when he demanded the badge of you in the cave. You did not tell him so. Your answer was that you would not give it up. And you did not leave it in the cave, for Tsing searched the place thoroughly after you had been taken away.'

"Clever old scoundrel, isn't he?"

"Both clever and a scoundrel I fear," I answered, "but he had the most urgent reason for wishing to get hold of the article."

"Of course!" Edward exclaimed. "It connected him directly with the Boxer revolt. Mighty anxious he would be that it should not fall into the hands of an American or other foreigner."

I was greatly startled at this, for Edward's correct inference as to the matter justified Yuseng's fear that knowledge of the existence of the badge was dangerous to him. No wonder, then, that he wanted us all under his roof where we could not hope to communicate the fact of his treachery to others.

"What did you say to his argument?" I asked.

"Nothing. He had me, and I saw there was no use trying to hoodwink such a past master of deceit. I shut up severely, so to speak, and not another word did he get from me."

"Didn't he attempt force?"

Edward hesitated a moment.

"You shouldn't be so inquisitive," he said. "I suppose I shall have to admit that he gave me a taste of the rack."

"Edward!"

"Don't shudder. It was only a taste. I didn't enjoy it, but it didn't kill or make me yield. He stopped it after a while and told me the dose would be repeated daily in increasing quantities until the badge should be in his possession. Now he's got the thing there's no more to dread on that score."

"I hope you are right. You heard him say that I was to write to father? He will not let me go."

"I shouldn't think he would. I've been thinking about it. I had plenty of time, you know. Of course, I didn't dream that you would find your way to him, but thinking of myself I reasoned that he could not afford to let me go. It was only a question how long he would let me live."

"And now he insists that all of us must be here. Can we trust him?"

"Not in the least; but I don't see but that we've got to take our chances with him as host. Tell me how you came here."

I told him briefly, taking care to omit reference to the secret document. It was easily done, for Edward, in his great love for me, had the absurd idea that all I need do was to address the mandarin to obtain audience at once. I was just finishing an account of Yuseng's arguments when the mandarin came in.

"Well," he said pleasantly, "is the letter written?"

"No, your excellency," I faltered, "we had so many things to say to each other—"

"I quite understand," he interposed as graciously as if we were fast friends. "There are many matters that press for my attention. Suppose you let me dictate the letter. You need not set down the words if what I say is objectionable."

I glanced at Edward.

"Write," said my lover quietly.

So I prepared to do so and Yuseng sat himself leisurely down in his teak wood chair.

"Begin," he said, "with 'House of the Mandarin, Yuseng Chang Ho.' You may make the address in such form as is customary in communications between daughter and father."

I wrote as dictated and added, "My dear father and mother." Then I took down the following from his lips:

> His excellency, the Mandarin Yuseng Chang Ho, desires me to extend to you the hospitable shelter of his house until the present crisis in Peking has passed. He assures you that it will be extremely dangerous for you to remain at Toyi Shen's, and he fears that the legation will be equally hopeless as a refuge. The Mandarin Yuseng has discovered the whereabouts of Mr. Kingdon and has restored him to me unharmed. Mr. Kingdon is now with me and assents to what I write. The Mandarin Yuseng, in view of the perilous conditions that prevail upon the streets, does not think it advisable that I should go to you, and he begs, therefore, as I beg, that you will accept his invitation without delay and come at once to his house.

"Now then, will that do?" asked the mandarin.

"It isn't wholly true," said I.

"But it will have the desired result, will it not? What do you think, Mr. Kingdon?"

"I cannot answer for Mr. Warren's views," Edward replied. "The letter is not written as Miss Warren would have written it, and her father will recognize that fact. I should suggest, therefore, that you permit her to add the words, 'Dictated by the mandarin, Yuseng,' at the bottom."

Yuseng considered a moment.

"There is no objection to that," he decided; "write the line, Miss Warren, and sign your name."

I complied and handed the paper to the mandarin. He gave it to Edward.

"Indorse it across the face with your name, Mr. Kingdon, if you please," said he.

I was surprised to see how readily Edward acted on the suggestion. Yuseng then read the letter through and said he would have it despatched at once.

"I must be away for some hours," he then said. "When I return I hope to find Mr. and Mrs. Warren here. Meantime I cannot let you feel that you are other than my guests. This official chamber is not suited for your present relation to me. I beg you to go to my library, where I have ordered tea to be served, and that you may feel at home, as the Americans say, your own servant will wait upon you. I bid you good morning."

"Is this the height of courtesy, or is it a piece of unbounded treachery?" asked Edward, when Yuseng had left us.

"He puzzles me," I answered. "Let us hope that he has cut loose from the Boxers and that he really means to protect us. Do you suppose father will come?"

"I wonder! The dictated letter was a capital idea for both parties. Your father will feel the compulsion between the lines, and he will be disturbed. I should not know how to advise him if he could ask me. It wouldn't surprise me if your mother should say the deciding word. She will be anxious to be with you."

That surmise proved correct. Father, on reading the letter, wanted to go at once to the legation and lay a charge against the mandarin for forcibly detaining his daughter, and he was only dissuaded from that course by the arguments of Mr. Toyi and the pleadings of my mother.

He soon was led to fear that there would be more danger for me in that course than in accepting the strange invitation. Mr. Toyi, who evidently had no suspicion of Yuseng, and counted him as one of the pro-foreign party, thought the arrangement the best that could be devised.

With mingled fear and rejoicing he came, and we four were together again.

CHAPTER XVI.

The Funeral.

UNTIL the end came, each day was like every other. Everything that Chinese hospitality could do was done for us, and in every respect, except that of liberty, we were in possession of all the privileges we could reasonably desire.

Wu attended us, we were comfortably roomed, bountifully fed, and, for a few days, provided with ostensible information as to what was taking place in the city

I say ostensible, for we distrusted the information brought to us by Yuseng from the start, and this distrust was augmented when no letters were brought to us from Mr. Leung in answer to those that my father sent him. If Mr. Tovi called upon us we did not know it.

From the beginning we were watchful. Neither father nor Edward had the slightest faith in Yuseng's ultimate intentions regarding us, and if there had been any way to escape, and, what is more to the point, any place of refuge that we could hope to gain, we would have tried it.

As it was, there was nothing to do but wait developments, hoping that matters in the capital and empire would so shape that it would be a politic stroke for Yuseng to set us at liberty.

From all that we could learn, hope of such an outcome diminished daily. We heard that our legation had been burned, and there was a rumor that one of the foreign ministers had been murdered.

This came to us through Wu, whose association with the servants of the household enabled him to hear things occasionally that were not brought to us by Yuseng. For example, he not only did not inform us of the murder of the German minister, but denied it emphatically when we asked him about it.

We saw less and less of Yuseng as the days passed. At first he had been as courteous as if he were really friendly to us, and we prudently accepted his attentions as if they were genuine; but the mockery could not continue forever when he knew that one in our party was fully aware of his duplicity.

His manner gradually changed until it was only too apparent that he regretted the situation. It seemed clear enough that his plans had miscarried, that he had not dreamed we would have to be so long under his roof.

We dreaded his resort to some unexpected means of ridding himself of us.

On more than one occasion we suspected Yuseng of having contrived an escape for us. Doors would be found invitingly open and unguarded. Did he hope that we would be tempted to throw ourselves upon the mercy of the mob in the streets? If so, he was disappointed.

Now and again I almost came to think him sincere. I was in the gravest doubt about it all. We certainly were subjected to no indignity, and if quiet had been restored in the capital and Yuseng had escorted us to the coast, or to any other place of undeniable security, I should have been tempted to say "I told you so."

Whatever illusion there was with respect to his intentions and character was dissipated by a discovery made by Wu. He came to us one day all of a tremble.

"Tsing Lao is here," he said. "I saw him."

Naturally I was startled, and I told again how I had heard Yuseng give the order for the execution of Tsing.

"Nothing could have been plainer," I said. "He told his secretary to have Tsing beheaded, and he emphasized the command by a blow upon his chair arm."

"What's that, Jannie?" exclaimed Edward; "say that again. A blow on his chair arm, did you say?"

Then I repeated the scene in the audience chamber.

"Something worth thinking of there," said Edward. "I did not tell you quite all that happened to me in Yuseng's torture chamber. At one period, when I was stubbornly refusing to say yes or no, he had three men confront me with spears. 'Run him through,' said Yuseng, 'if he does not speak,' and as he gave the command he struck his chair arm once.

"The villains advanced upon me until their spear points touched my breast. Then they halted. After a pause Yuseng announced that he had changed his mind. 'Lock him up until to-morrow,' he said then, and he struck his chair twice. It may be that a single blow is to be interpreted as negativing his command."

"It must be so," I added, "for when he sent for you he gave his chair two blows."

"All of which," said father, "merely emphasizes the significance of Wu's discovery

"Tsing was not executed. It is a reasonable inference that he has been

spared to do Yuseng's ugly work for him and that he has been brought here to get rid of us."

After we had talked it over it was decided that the men should confront Yuseng with what they knew, and they did so that evening. He expressed the greatest surprise that Wu should have thought he saw Tsing. The boy must be mistaken, he said; Tsing had been beheaded promptly.

Then father told him that we felt ourselves a burden upon him and said we would prefer to go elsewhere if there were any way of departing.

"I cannot take offense," replied Yuseng grandly. "The times are so troublous that no man feels secure. I will confess that your presence here is not without its menace to me. Do you think that if you were once to the south of the city you could make your way to the coast where the foreign armies have possession?"

"I don't know what the conditions are between here and the coast," father answered, "but I should prefer to try than await death here."

"You are doubtless quite right, Mr. Warren, for I fear no foreigner can survive the peril in Peking, no matter how scrupulously he is guarded. I think I can provide you a way to leave the city. Once outside, you will have to depend upon your own resources."

"Tell us the way," father cried.

It was rather a startling plan that Yuseng suggested. He proposed to provide a funeral for us.

Upper class funerals in China are very imposing affairs. Great palanquin hearses are provided for conveying the remains to the cemeteries beyond the city walls. The size of these palanquins vary according to the rank of the deceased.

Yuseng proposed to give out word that one of his wives was dead. He had five, not one of whom had we seen during our stay in his house. He would then make the usual arrangements for interment and funeral procession.

"My palanquin hearse will easily hold your party," he said. "The carriers can take you to a short distance this side of the cemetery where there is a grove within which you can make your exit without attracting attention from persons in the cemetery. In due time the carriers will return, and nobody in Peking will be the wiser. How you will get on in the country I cannot foresee."

Nor could we, but we eagerly accepted the suggestion, and Yuseng set about the matter without delay. All was ready on the second day after the plan was adopted.

During the period of preparation the mandarin reassumed his friendly manners. He told us a great deal about the rioting going on in the city, discussed our chances of evading the Boxers when once we were outside, and went over maps with father and Edward, advising them as to the best route to attempt, and, in short, doing every thing that a sincere friend could do in our behalf.

"He's sincere enough in wanting to be rid of us," said father the evening before our departure.

"I have not been given to raising gloomy doubts since we left Shanshan," remarked mother, "and I hesitate to speak now; but have you thought of the possibility that this is a device on the mandarin's part to have us attacked and destroyed by the mob while we are being carried through the city?"

"I have," replied father and Edward together.

"And you have no fear of it?"

How much the servants in the household knew about the scheme I cannot say, but when it was time for us to go—mid-forenoon—all the domestics were apparently collected in the farthest quarter of the house from us. One man, whether a servant or not we were not told, was presented to us in the audience chamber.

"This man," said Yuseng impressively, "understands what is going on. He will lead the way and set you down at the place I have described. The carriers suppose that it is a genuine funeral and that certain departures from custom are due to the condition of the times.

"I need not warn you that you will have to be absolutely quiet until the grove is reached. Then you will need to wait word from this man before leaving the palanquin. He will disperse the carriers on a pretext and let you know when the way is clear. You may trust him implicitly, for"—here the mandarin, who had been speaking in Chinese, re-

sorted to English—"he understands that if any harm comes to you while you are in his charge, his head will be the forfeit. May good fortune attend you."

At that moment I almost believed in Yuseng. He conducted us to an inner court where the palanquin was waiting for us, adding as we went, that he should accompany the procession as far as the city wall. He dared not go beyond. A living mandarin might be attacked, whereas a funeral carriage was certain to be respected.

We took our places in the ghastly vehicle, the curtains were drawn and made fast, and the carriers were summoned. They came shuffling softly over the pavement and formed at either end of the palanquin.

Other attendants were marshaled to give the device a sufficiently serious aspect, and with much less delay than I had anticipated, and no pretense of ceremony, we were started on our strange journey.

It was like lying in one's berth in a steamer stateroom. The car swayed gently as the carriers walked, and now and again there was a faint creaking of the woodwork.

At first all was very still, but soon after passing the gate we heard the noises of the streets, and these continued with varying intensity for hours. There was an occasional halt, as if some obstruction had been met, and we heard the head man calling attention to the funeral car of a mandarin, which was sufficient to clear the way for us.

Whether Yuseng kept his promise of accompanying us to the outer gate we had no means of knowing, but that we had passed it at last was evident from the cessation of noise

We advanced steadily across the plain to the cemetery. I could hear my father and mother breathe, but I dared not address them a word. Sometimes Wu stirred restlessly, and the nearest approach we had to communication with one another was father's low warning Edward was in the forward end of the car, designedly, as I supposed; I at the back.

How did we know that we were not being carried to destruction? What if we should be locked in a tomb from which no friendly Leung could rescue us?

After so long a time that I was sure night had come we heard the roll of distant thunder. This steadily increased, and frequent flashes of lightning made a momentary dull glow in the closed car.

Not long after this the palanquin was set down, and I heard a low murmur of voices among the carriers. This ceased in a moment, while the crashing of thunder was startlingly loud

Two or three minutes passed thus and then there was a sudden but quiet stirring in the car. Edward was turning about at the front end.

"Be prepared to move instantly," he whispered; "ask no questions, but when I give the word, tear away the curtains on the east side of the car and run!"

I got cautiously on my knees, with my hands upon the curtains beside me. The others did the same, except Edward, who quickly tore away the curtain, or a part of it, on the west side. Daylight poured in. It was not bright day, for the sky was black with clouds and it was near evening, but it was not night.

Edward leaned out of the car window, a revolver in each hand. I watched his movements, and glancing beyond him a distance of fifty feet or so, I saw our carriers resting in a group under a tree.

"A-a-a-a-ah!" hissed Edward in a long-drawn aspirate, contorting his features into the ugliest possible shape and waving his arms frantically.

The astounded carriers seemed stricken with fright. Their jaws dropped, their eyes bulged, their limbs were paralyzed. As this latter effect was precisely the opposite of what Edward was trying to produce, he hissed again and behaved with even more extravagance, making as if he would get out of the car and run upon them

His second manifestation had the desired result. With low howls of superstitious terror, the carriers scrambled up as one man and fled toward Peking.

"Now, then!" exclaimed Edward, "run! not toward the grove. Go back till I tell you to stop."

We ripped down the curtains and tumbled out with all possible speed. I caught just a glimpse of a dense grove on rising ground ahead of us, and then sped across a level field grown high with

rank grass, that made haste more than difficult, until I heard Edward say, "Down, flat!"

I don't think trained military could have obeyed more promptly. I lay face down, panting with exertion and excitement. Edward presently wriggled by.

"Crawl," he whispered as he passed; "there's a creek a few rods away and a raft tied to the bank. We must make it as soon as we can."

It was no time to wonder how he knew all this, or what had inspired his conduct. He had told us to ask no questions. After him, therefore, we crawled, and soon we were soaking wet as we passed over swampy ground. It mattered not at all, the more especially as about then the clouds burst and sent down a torrent that drenched our backs.

Amid the most tempestuous demonstration of the elements that ever I witnessed, we came to the creek and waded on hands and knees to the raft.

When we climbed aboard it and looked around, the high grass through which we had crawled hid all but a fringe of the shore. We did not stand up, for Edward warned us against that as he cut the cord that held the raft to the bank. Taking a pole, then, and lying on his side, he pushed the rude craft out into the current.

Darkness was coming rapidly, but the gloom was not so great that I could not see the palanquin hearse when we chanced to pass a spot where the grass on the bank grew low for a short space.

A number of men—they did not look like our carriers—were gesticulating wildly around it, and just as they were shut from view I saw them start rapidly toward the grove.

Edward saw, too, and he chuckled.

"Fooled again," said he, and gave his attention to the pole.

"Can I help?" asked father.

"There's only one pole," replied Edward. "After dark we may go ashore and try to find another."

It was not long before he drew a long breath and stood up.

"Can't see a thing," he said in a natural tone. "Don't know where we're going."

"This stream must flow into the Pei-ho," said father. "Won't it be as well to let the current take us along?"

"Yes, and when we go aground we'll interpret it as a sign that we should disembark, for the Pei-ho is too much overrun with the enemy to make it wise to risk travel on it."

"You might tell us what has happened," I suggested.

"We've escaped death once more," answered Edward. "Oh! the malignant, sugar-coated treachery of that master fiend Yuseng!"

"Did he play us false, then?" asked father.

"I should say so! We hadn't been very far on the way when I simply couldn't resist the temptation to cut a hole in the front curtain. It didn't take much of a slit to enable me to look ahead, and I kept my eye glued to that crevice all the way. Passers took the thing for a genuine funeral, and we had enough respectful salutations to last a lifetime.

"I saw the grove from a long way off and supposed it was the place Yuseng had so carefully prepared us for. We were to await there word that the way was clear. Oh, yes, indeed! and when we got near there the head man told the carriers to rest while he went on to investigate in our behalf. He didn't tell them that latter, but that was the size of it, of course. I had, meantime, seen this creek and raft. The head man went up to the edge of the grove, where he met Tsing Lao—"

A general gasp of astonishment interrupted him.

"Our old friend, and no mistake," continued Edward. "I thought I saw the plan in full, and I guess I did. Tsing had a band of murderous ruffians on the way, or in waiting. I inferred that they had not arrived by the way he gestured.

"Probably they intended to fall upon us after dark and we had got to the rendezvous a little ahead of time. At all events, matters were not quite ripe, and when I saw Tsing and the head man go up into the grove I felt that it was time to act. Is that all clear?"

"Perfectly," said father; "and you think they are hunting for us in the grove?"

"Of course. Where else would fugitives hide?"

We did not wait for the raft to go aground before making land, for after a

time we saw lights twinkling ahead. As we dared not approach a village, we disembarked. The rain had ceased, but the sky was still clouded and we were dripping wet.

In that condition we plodded all night, tending as nearly south as we could guess the direction, and at daybreak took shelter in an abandoned hut.

Such was our experience for four days and nights, by which time we had come so near to Tien-Tsin, where fighting was in progress, that we were prevented from further advance.

Meantime we had suffered much and were in constant peril. The men, at fearful risks, obtained food occasionally in the outskirts of villages, prowling about detached houses after midnight, and finding time to sleep I knew not when. We walked little by day, and at night we had frequently to turn aside to avoid going straight into a camp of Chinese soldiery.

And here we were at last within sounds of friendly guns, but between us and them were we knew not how many deadly foes. Worse yet, we knew not just where they were located.

It was when we had halted at sunrise, after a hard march through the night, and were looking in blank despair at a small village ahead of us, that Edward remarked, "It does look as if it was thus far and no farther."

A triumphant shriek upon our right startled us. We lay flat at once, but it was too late. We had been seen. There was nothing for it but to rise again and make the best fight we could.

From the edge of a forest where, perhaps, they had been sleeping all night, arose a score of Chinese. They were not soldiers, though some were armed.

Brandishing a weapon at their head was Tsing Lao and, as we now knew him, the deadly emissary of the mandarin, Yuseng.

Father, Edward, and Wu stood in front of mother and me and waited for Tsing Lao and his band to come within sure range.

They never reached us. Along a road beside the forest there dashed four troopers, each in a different uniform. Seeing us, and perceiving the situation, they spurred directly at the Chinese, and a shot from one of them sent Tsing Lao staggering to the ground.

The other troopers fired, and other Chinese fell. The rest fled in panic. Then the troopers rode up to us.

I presume you read in the newspapers how four soldiers — an American, an Englishman, a Frenchman, and a German—rode all the distance from Peking to Tien-Tsin bearing dispatches; how they cut their way with marvelous daring and success through village after village; how they escaped the hundreds of bullets that were sent flying after them; and how they reached their destination with the last authentic news that came from the beleaguered foreigners in the capital.

These were the four. By their aid we made the last brief stage in our journey to safety, for it happened that between us and the allied forces at Tien-Tsin there was at that time no considerable detachment of the enemy, that brush with Tsing Lao's band making the last of the skirmishes that the troopers fought.

Before noon we were among American soldiers, our eyes too hungry for the sight of our country's flag to close them for needed sleep.

(The end.)

FREIGHT MAKES 1,165 MILES IN 83 HOURS.

A BALTIMORE and Ohio freight train has established a record between Pittsburgh and New Orleans. The United States government, in anticipation of a flood near New Orleans, ordered twelve cars of steel-piling from the Carnegie Steel Company provided that the shipment be delivered in New Orleans on or before April 17. The train left Pittsburgh at 4.13 P.M., April 10, over the Baltimore and Ohio, reached Cincinnati by way of Parkersburg, West Virginia, April 12 at 8.19 A.M., and arrived in New Orleans over the Queen and Crescent at 3.15 A.M., April 14. The trip, a distance of 1,165 miles between the two points, was made in eighty-three hours. This is the fastest time ever made by either passenger or freight train for the same distance, the railroads declare.

On the Editorial Carpet

Where the Man in the Editorial Cab and His Readers Talk It Over.

ADDING TO THE ROLLING STOCK

WITH this number of THE RAILROAD AND CURRENT MECHANICS we add thirty-two pages of reading matter. This is necessary in order to print the full equipment of railroad stories and articles. More pages will be added whenever it is found necessary. We really think this number of the old magazine is the best as well as the biggest we have ever put out. It certainly contains sufficient variety to please every one; but, still, if it is not what you want, write in and tell us.

September will be the first of the big fall and winter editions. Among the illustrated articles one will describe the most marvelous of all railroad detectives—the bloodhound. Of late years these four-footed sleuths have become important and invaluable aids of the special agents and police of the railroads. They are unerring. Once on a trail they never stop until they have their quarry. It is odd to think that the evidence of a dog will bring about the conviction of a train-robber or a railroad thief; but such is the case.

This article was written by Thaddeus S. Dayton, and is a very fitting and interesting sequel to "The Railroad Police," by H. A. Roach, which appears in this issue.

T. D. Day will describe how cipher codes for telegraphy are made. F. B. Lovett's article, "Southpaws of the Rail"—the celebrated left-hand operators who have made the craft famous—will appear. There will be another of Dr. William Brady's interesting and valuable papers, "The Riddle of Rheumatism." Do not think that we have completed the series, "Ties That Bind," which ran so many months and made such a big impression on our readers last year. Two more brotherhoods have been added to the series: "The Brotherhood of Railroad Signalmen," by F. H. Sidney, and "The Car and Locomotive Painters' Association," by Charles E. Copp. Both of these will appear in September.

We have found a special place for the next paper in the series, "Birth of Great Railroads." This is the romantic history of the beginnings of the Chesapeake and Ohio Railroad. C. H. Claudy will have another valuable paper in "Science Made Simple," and Arthur Curran's interesting article on "Diamond Stacks" will be of special value to the old rails who remember those interesting locomotives.

The complete novel will be a big, graphic, gripping railroad romance entitled "The Fight for the Pass," by W. S. Wright. You have read in these pages such novels as "The Paymaster's Special," "By Right of Purchase," "Tower D. C.," "The Jumping Off Place," "inside" stories of railroad life that find an outlet to the public only through this magazine, and we think you

will say that "The Fight for the Pass" is the best ever. If you like a romance of the rail in which red blood, courage, determination, and adventure predominate, then you will like this story.

Among the short stories will be "Graham White's Hunch," another one of those funny and intimate stories of the cab so well told by Donald Francis McGrew. "Honk and Horace" all we need to say is that they will be "among those present." "The Obadiah Sipe System," by H. M. Lome, is the story of a station agent and a consignment consisting of one monkey. "Fifty Dollars a Match," by George Van Schaick, is a Western story with a real punch

The author of the Spike Malone stories has sent in word that he is back on the literary division with a fine new train made up of Spike specials.

Swing aboard for September, boys! You'll not regret the ride.

CAN THE AGITATORS.

DURING the past few years there has been a great deal of talk about the high cost of living. Much of this has been valueless because based on incorrect assumptions. One of the most ridiculous fallacies in the entire list of errors is the notion that freight rates are too high. Any schoolboy should know that they are lower here than anywhere else

Notwithstanding this, the Interstate Commerce Commission persists in its policy of reducing rates or preventing reasonable increases

This policy is, presumably, intended to "encourage" the producers who ship their commodities by rail. If so, the object has been attained The consumer does not, however, benefit, because the shipper never shares his good fortune. If rates are reduced, the shipper "pockets the difference," and the consumer goes on paying as much for necessities as before. The commission injures the railroads without benefiting the public in the slightest degree.

While the railroads must submit to regulation, the shipper is permitted to charge what he pleases for everything he sells. The railroads have been lectured about the injustice of "discrimination," and yet the professional politicians take a malicious delight in discriminating against the railroads whenever they get the chance

One of the most vicious tendencies of the present time is to reduce the rates of prosperous roads on the broad ground that they are making too much money

Why penalize industry?

All these evils proceed from the fact that members of Federal and State commissions are chosen through political "pull" and without regard to their personal qualifications

Men who know nothing about practical railroading are allowed to bawl their asinine orders all over the land, and create confusion and trouble wherever they go.

During the past ten years the "regulation" of railroads has been characterized by an outrageous abuse of power on the part of those politicians who have been in a position to vent their spleen on their betters. It has been one big saturnalia of investigation and threat of jail sentence It has become insufferable

There is a remedy for this state of affairs. A law should be passed compelling railroad commissioners to undergo a stiff examination. These examinations should be as difficult as possible and include locomotive construction and operation, car-building and maintenance-of-way subjects. Failure to pass this examination would automatically terminate a commissioner's occupancy of office

Such a law would quickly put a stop to the activities of professional politicians and perpetual office-seekers. This country does not need or want men who imagine, assume, or suppose—it needs men who *know!* The unfit, the incompetent, the uninformed are nothing but a hindrance and a block to prosperity.

Our northern neighbor, Canada, can teach us a number of lessons in the regulation of railways. With a population only one-tenth of ours, the Dominion is traversed by a transcontinental railway—the Canadian Pacific—which is one of the richest and most powerful transportation companies in the world. Very soon there will be two more lines of equal importance running from the Atlantic to the Pacific. All three have received the assistance of parliament and the most kindly consideration.

Canada's prosperity is due solely to the railways—and the people know it. If friendly relations between the railways and the government have been so successful up there, why not here? In what way do the American people profit by constant persecution and hounding of the railroads?

That question is the key-note of the whole matter. The American people do not profit, but their political barnacles do

Remember one thing, Mr. Reader The

people of the United States will never prosper, nor will hard times disappear, until the railroads are permitted to make money.

RAILROAD MEN AIDING SCHOOL HYGIENE CONGRESS

RAILROAD men are doing much to help aid the cause of the Fourth International Congress on School Hygiene, which is to be held at Buffalo the last week in August, and which has for its object the improving of the health and efficiency of school children It is the aim of the organizing committee to make the conference one of benefit to every community in the country

Delegates will be present from all the States, as well as from all the leading nations The railroads will be represented by delegates appointed by the Railroad Surgeon Associations

In response to an invitation issued by Dr. Thomas A. Storey, of the College of the City of New York, secretary-general of the congress, a large number of railroad presidents of America are lending the aid of their press departments for the purpose of advertising the serious importance of the Buffalo meeting.

The congress will be held under the patronage of President Wilson and under the presidency of Charles W. Eliot, president emeritus of Harvard University. It is expected that several thousand delegates will be in attendance.

MR. ARTHUR CURRAN'S REQUEST

MR. ARTHUR CURRAN, whose articles on locomotives and railroading have appeared from time to time in this magazine, is writing an extensive history of the steam locomotive from its beginning to the present day. The book will be profusely illustrated with types of all locomotives from the days of Stephenson's "Rocket" to the steam marvels of our time. Mr. Curran would like to get in touch with any one who has photographs of old locomotives which he can use to illustrate his work. His address is 42 East Fifty-Seventh Street, New York, N. Y.

ANSWERS TO CERTAIN SIGNALS

E. W B., Milner, Idaho.—Concerning "How the Various Parts of a Locomotive Work Together," by C. H. Claudy, in our June number, there are air-brake systems, or have been air-brake systems, in which the air both removes the brakes as well as applies them. That the modern automatic air system depends on spring or gravity to remove the brakes was not essential to his article. In the larger sense, air in an air-brake is used to pull and reverse the brakes just as in a locomotive steam is used to pull even though the biceps and triceps in the engineer's left arm are required to open and close the throttle. Nobody would say that the locomotive is stopped or started by muscular power, merely because human mechanism regulates the steam mechanism.

R. M H., Knoxville, Tennessee.—A parody on "Casey Jones" should prove a valuable addition to American poetry and would find a resting-place in these pages provided (1) that it is original, (2) that its prosodic equipment will stay on the rails, and (3) that it does not libel the illustrious Brotherhood of Poets, each one of whose entire membership claims to be the original author of the famous verse

B J. K., Los Gatos, California.—The author of "Off Again, On Again, Gone Again, Finnigin," is Strickland Gillilan, a native of Jackson, Ohio, forty-four years of age. He is the president of the American Press Humorists.

WHO CAN ANSWER THESE?

THE editor of THE RAILROAD AND CURRENT MECHANICS is seeking the correct answers to the following questions. He prevails upon his readers to help him out. He would be pleased to hear from any who can answer one or all the questions

When was the conductor's uniform first used, and on what road?

When was the first passenger ticket issued, and by what road?

Who was the first general passenger-agent?

When was the conductor's punch first used, and on what road?

On what road was the first ticket-agent employed, and at what station?

When was the first mileage-ticket issued, and on what road?

Over what road was the first excursion train operated, and when?

When was the first commutation ticket issued, and by what road?

When was the first coupon ticket issued, and by what road?

When was the first round-trip ticket issued, and by what road?

When was the first piece of baggage checked, and on what road?

When was the first railroad station established, and on what road?

J. B. KING IS LOCATED

EDITOR, THE RAILROAD & CURRENT MECHANICS:

I NOTICE that you have received a number of letters asking, "Who is J. B. King?"

For the past seventeen years I have believed that I was the original J. B. King I will give you a short history of myself, and it

is for the old-timers to say whether or not I am the original

I branched out in railroad work in 1886 with the N. Y. C. and St. L., at Chicago, being seventeen years old at that time. In 1889 I went to the I. C., at Chicago. In the winter of 1894 and 1895 I was with the C. and A. In the summer of 1895 I went with the C. and B. I. In 1903 I came South and worked for the Cotton Belt for two years, then I was transferred to Waco, Texas, on the same road. I am now with the I. and G. N., at Palestine, Texas.

I began to sign my name in the style well known to everybody in the winter of 1890. At that time I was yardmaster for the Elgin, Joliet and Eastern Railway. I have been a yardmaster ever since.

My name is James B. King. An old-timer named Luckinbill, who was working for me in charge of an engine, was something of a penman. He and I worked up the signature during the winter of 1896.—J. B. KING, Palestine, Texas.

THE FIRST RAILROAD

EDITOR, THE RAILROAD & CURRENT MECHANICS:

IN the June number of your magazine you state that the first railroad in America extended from the quarries at Quincy, Massachusetts, to a point *near* the mouth of the Neponset River. You are in error. This railroad extended to a point on Shepard's Creek, a tributary of the Weymouth Fore River, about nine miles from Boston. A portion of the grade of this old railroad is utilized at present by the Fore River Shipbuilding Company as a connection with the New York, New Haven and Hartford Railroad at East Braintree.—C. E. B., Bremerton, Washington.

ACCORDING TO BAEDEKER

EDITOR, THE RAILROAD & CURRENT MECHANICS:

REGARDING "Turning to Baedeker's America" in your June number, I have something to say as a German, because your wrongly criticized the Baedeker. Regarding the relative comforts of German and American railroads, for the price you pay in the United States, you can have the same comfort on German railroads. A train *de luxe* in Germany is equal to a similar train in America, but the German passenger can take a cheaper express train provided he does not care to pay the higher tariff.

Is it possible to travel in America on an express train for one dollar a hundred miles? Germany has not the great distances that America possesses. If a German must make a journey of three or four hours, he does not need great luxury for so short a trip.

Is Baedeker wrong in his description of your coaches? I don't think so.

Don't you think it curious that you cannot purchase alcoholic drinks in certain States? You don't find such discrimination in the whole of Europe.

The elaborate system of American passenger terminals does not even direct you to the right car. If you find your train you are forced to ask for your car. I have never seen German station officials in solemn conclave solving a problem—never, I say to you!

It would be interesting for you to take a trip to Europe and visit England, Germany, and France. This would convince you that there are still other countries on the globe that have the same high culture as the U. S. A. —A. W., Hermosa Beach, California.

IN THE LONDON TUBES

EDITOR, THE RAILROAD & CURRENT MECHANICS:

YOU are in error in your answer to your correspondent regarding the tube railways of London. Trains are started by a bell, not by a flag as stated. Four cars are run on almost all trains. These are in charge of three conductors. Passengers enter at the end of the cars, which are level with the platform. The conductors control the gates of these entrances. During rush hours trains are run every minute. There are seven tubes in London, instead of three as you stated.—H. C., Eatonville, Washington.

WORKED IN NINETEEN FOREIGN COUNTRIES

EDITOR, THE RAILROAD & CURRENT MECHANICS:

I HAVE just read "The Tropic Boomer" in the October number of your magazine. I wish to say from personal experience that it is true in every respect. I am a boilermaker and worked in the railroad shops at Rosario, six hundred miles in the interior of Argentine Republic. It is the largest shop in South America and would cover eight ordinary city blocks. The wages I received there would not make both ends meet. Let me tell the railroad boys that there is no country like the United States or Canada for food and wages combined.

I left Kansas City four years ago with $15. Since then I have worked in Chile, Argentine Republic, Uruguay, Brazil, West Indies, Great Britain, Denmark, Germany, Holland, Belgium, France, Spain, Italy, Greece, Turkey, Russia, Egypt, Algeria, and West Africa. I returned home with $10.—A. V., Kansas City, Missouri.

TAIL LIGHTS AND EXTRAS

EDITOR, THE RAILROAD & CURRENT MECHANICS:

YOUR reply to C. W. H., Tunkhannock, Pennsylvania, in your June number states that violations of Rule 19 in regard to tail lamps being used instead of green flags for markers are rare. Pardon me, but that has been the system used on the entire Union Pacific, Southern Pacific, and other Western roads for over a year. We never see anything but tail lamps now, regardless of the

tram I never heard why the change was made

I don't think C. W. H. is much of a railroad man. If he was, he surely would not speak of such a thing as the "first" section of an "extra" train. An extra is so called and the engine number is added. If engine 351 goes out of here with an extra train it will be known as "Extra 351."—E. R. S., North Platte, Nebraska.

ADDRESSES WANTED

INFORMATION is wanted regarding Emil Lichte, who was working with a construction gang near Galveston, Texas, three years ago, where he was known as Jack O'Brien. Emil Lichte originally came from Bremerhaven, Germany, and went to Cleveland, Ohio, and from there to Texas. His mother died recently. Address B. R. LOETHER, 35 Ward Street, Waterbury, Connecticut.

A reader of this magazine would like to have the address of his brother, Oscar M. Graybill, a telegraph-operator, who has worked on a number of railroads in the United States and Mexico. He was last heard from in 1893. His father died last March. Any information will be appreciated by S. M. GRAYBILL, 89 Meeker Avenue, Newark, New Jersey.

THE POETS' CORNER

LARIAT BILL

EDITOR, THE RAILROAD & CURRENT MECHANICS:
I see requests in your inimitable publication, of which I am an appreciative reader, for poetic "gems" of the rail. While I am long past three score and ten and my hands and chirography have flat wheels, I trust you will be able to decipher and publish the enclosed. I copied it from an ancient scrapbook which was my delight when I used to sling wood from the water hole into the fire-box 'way back in the '50's.—L. A. PALMER, Memphis, Tennessee.

"I WAS running the Frisco fast express;
An' from Murder Creek to Blasted Pine
Were nigh onto eighteen miles, I guess;
The toughest bit on all the line
The road were down grade all the way—
And we pulled out of Murder a little late,
So I opened the throttle wide that day
And a mile a minute were 'bout our gait.

"My fireman's name was Lariat Bill,
A quiet man with a lazy way,
Who could rope a steer with a cowboy's skill,
Which he'd learned in Texas, I've heard him say.
The coil was strong as tempered steel,
And it went like a bolt from a cross-bow flung,
An' arter Bill changed from saddle to wheel,
Just over his head in the cab it hung.

"Well, as I were sayin', we fairly flew,
As we struck the curve at Buffalo Spring,
An' I give her full steam and put her through,
And the engine rocked like a living thing
When all of a sudden I got a scare—
For there on the track was a little child!
An' right in the path of the engine there,
She held out her little hands and smiled!

"I yanked her over and called for brakes;
The wheels threw sparks like a shower of gold;
An' I knew the trouble a down grade makes,
An' I set my teeth as my flesh grew cold!
Then Lariat Bill grabbed his long lasso
An' out on the front of the engine crept—
He balanced a moment before he threw;
Then out in the air his lariat swept."

He paused. There were tears in his honest eyes
The stranger listened with bated breath
"I know the rest of the tale!" he cried;
"He snatched the child from the jaws of death!
'Twas a deed of a hero from heroes bred,
Whose praises the very angels sing!"
The engineer shook his grizzled head,
And growled: "He didn't do no such thing!"

"He aimed for the stump of a big pine tree,
An' the lariat caught with a double hitch.
In less than a second the tram and we
Were yanked off the track and into the ditch!
'Twas an awful smash, and it laid me out;
I ain't forgot it and never shall!
'Were the passengers hurt?' Lemme see—about—
Yes, it killed about forty—but saved the gal!

BEFORE IT IS TOO LATE

Contributed by John Stevens, Liberty, Indiana.

IF you have a gray-haired mother
In the old home far away,
Sit down and write the letter
You put off day by day.
Don't wait until her tired steps
Reach heaven's pearly gate,
But show her that you think of her—
Before it is too late

If you've a tender message,
Or a loving word to say,
Don't wait till you forget it,
But whisper it to-day.
Who knows what bitter memories
May haunt you if you wait,
So make the loved one happy
Before it is too late.

We live but in the present,
The future is unknown;
To-morrow is a mystery,
To-day is all our own
The chance that fortune lends us
May vanish while we wait,
So spend life's richest treasures
Before it is too late

The tender word unspoken,
The letter never sent,
The long-forgotten messages,
The wealth of love unsent

For these some hearts are breaking,
For these some loved ones wait,
Show them that you care for them—
Before it is too late

NOTTMAN

BY ALEXANDER ANDERSON.

THAT was Nottman waving at me,
But the steam fell down, so you could not see,
He is out to-day with the fast express,
And running a mile in the minute, I guess.

Danger? None in the least, for the way
Is good, though the curves are sharp as you say,
But bless you, when trains are a little behind,
They thunder around them—a match for the wind

Nottman himself is a demon to drive,
But cool and steady, and ever alive
To whatever danger is looming in front,
When a train has run hard to gain time for a shunt.

But he once got a fright, though, that shook him with pain,
Like sleepers beneath the weight of a train.
I remember the story well, for, you see,
His stoker, Jack Martin, told it to me

Nottman had sent down the wife for a change
To the old folks living at Riverly Grange,
A quiet, sleepy sort of a town,
Save when the engines went up and down.

For close behind it the railway ran
In a mile of a straight if a single span;
Three bridges were over the straight, and between
Two the distant signal was seen.

She had with her her boy—a nice little chit
Full of romp and mischief, and childish wit;
And whenever Nottman thundered by,
Both watched from the door with eager eye.

"Well, one day," said Jack, "on our journey down,
Coming round on the straight at the back of the town,
I saw right ahead, in front of our track,
In the haze on the rail something dimlike and black.

"I looked over at Nottman, but ere I could speak,
He shut off the steam, and with one wild shriek,
A whistle took to the air with a bound;
But the object ahead never stirred at the sound.

"In a moment he flung himself down on his knee,
Leant over the side of the engine to see,
Took one look, then sprung up, crying breathless and pale,
'Brake, Jack, it is some one asleep on the rail!'

"The rear brakes were whistled on in a trice
While I screwed on the tender brake firm as a vise,
But still we tore on with this terrible thought
Sending fear to our hearts—'Can we stop her or not?'

"I took one look again, then sung out to my mate,
'We can never draw up, we have seen it too late'
When, sudden and swift, like the change in a dream,
Nottman drew back the lever and flung on the steam

"The great wheels staggered and spun with the strain,
While the spray from the steam fell around us like rain,
But we slackened our speed, till we saw with a wild
Throb at the heart, right before us—a child!

"It was lying asleep on the rail, with no fear
Of the terrible death that was looming so near
The sweat on us both broke as cold as the dew
Of death as we questioned—'What can we do?'

"It was done—swift as acts that take place in a dream;
Nottman rushed to the front and knelt down on the beam,
Put one foot in the couplings; the other he kept
Right in front of the wheel for the child that still slept.

"'Saved!' I burst forth, my heart leaping with pride,
For one touch of the foot sent the child to the side,
But Nottman looked up, his lips white as with foam,
'My God, Jack,' he cried, 'It's my own little Tom!'

"He shrunk, would have slipped, but one grasp of my hand
Held him firm till the engine was brought to a stand,
Then I heard from behind a shriek take to the air,
And I knew that the voice of a mother was there

"The boy was all right, had got off with a scratch:
He had crept through the fence in his frolic to watch
For his father; but, wearied with mischief and play,
Had fallen asleep on the rail where he lay.

"For days after that on our journey down,
Ere we came to the straight at the back of the town,
As if the signal were up with its gleam
Of red, Nottman always shut off the steam."

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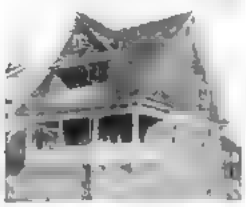

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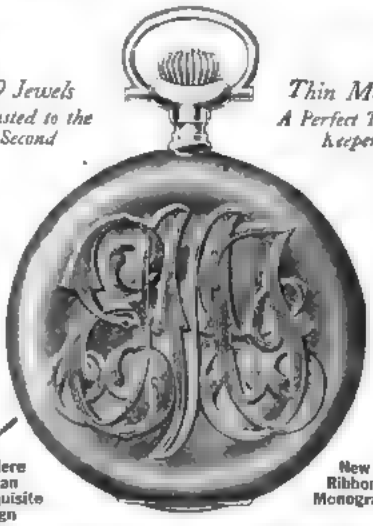

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Your Choice of Cases Open face or hunting cases, lady's or gentleman's sizes. These can be had in the newest ideas; ***Block and Ribbon Monograms, Diamond Set, Lodge, French Art and Dragon Designs, Etc., Etc.***

Yes, you may have your choice of any of these superb cases, and many others. The men who engrave these cases are world renowned experts. Just imagine a beautiful hunting case with your own monogram on one side and the emblem of your lodge on the other. Our catalog shows complete illustrations. Send the free coupon.

Sent on Approval We ship the watch on approval **prepaid.** You risk absolutely nothing—you pay nothing—not one cent, unless you want the great offer after seeing and thoroughly inspecting the watch.

Write for FREE Catalog Send for free book. It will tell you the inside facts about watch prices, and explains the many superior points of the Burlington over double-priced products. Just send free coupon or a letter or postal **NOW.**

FREE BOOK COUPON

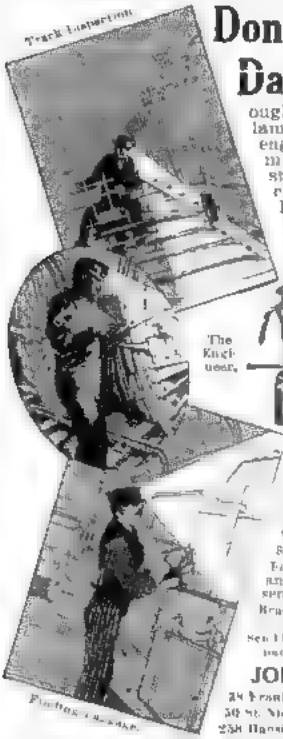
Burlington Watch Co.
19th St. & Marshall Blvd. CHICAGO
Dept. 1102

Burlington Watch Co. Dept. 1102
19th St. and Marshall Blvd. CHICAGO

Please send me (without obligation and prepaid) your free book on watches and a copy of your $1,000 challenge, with full explanation of your cash or $2.50 a month offer on the Burlington Watch.

Name .....

Address .....



Don't Work in the Dark!

Danger lurks in dark places, and every railroader ought to carry a Baldwin lamp—especially suited to engineers, trackmen, trainmen, baggage handlers, station agents, freight crews etc.

It is the only clear white penetrating light adaptable to railroad use. *The*

Baldwin Camp Lamp

A compact, powerful light, 3½ inches high, weighs (charged) 8 ozs. Burns acetylene. Can be carried on cap, belt, or in hand, or stood upon table. Don't blow out—absolutely safe. No oil or dirt.

For sale by leading Hardware and Sporting Goods Dealers—sent prepaid on receipt of price. Brass, $2.00; highly polished nickel with hinged hand, $2.50.

Send for Free Booklet telling how to insure a lifetime of pleasure.

JOHN SIMMONS CO.

24 Franklin Street, New York City
50 St. Nicholas Street, Montreal, Canada
258 Hansford Block, San Francisco, Calif.

The Railroad and Current Mechanics Agents' Bureau

A Department of Opportunity Where the Manufacturer Meets the Men Who Sell His Goods

ADDRESS ALL INQUIRIES FOR RATES AND ENROLLMENTS TO THIS MAGAZINE, 175 FIFTH AVE., NEW YORK

A Little Talk to Agents

THE Agents' Bureau has been a greater success than we anticipated—a success not only from the standpoint of the readers who have profited by it, but a success in bringing to the attention of thousands of new readers many worthy advertised products.

Magazines that do new things, that blaze new trails not only in their text but in their advertising pages, are contributing success after success to the growing list of advertised novelties, and it is in the grasp of every reader of THE RAILROAD AND CURRENT MECHANICS to make some stride, some advancement, by reading these advertisements with an open mind—a mind ready for money-making suggestions.

One of the most successful merchants of New England, owner of one of ten richest proprietary articles in America, was a prescription clerk in a drug-store when the opportunity came to break away and go in for himself. For months he manufactured his specialty himself in one room, pasted labels on, packed it, and then went out and sold it. When he needed assistance, he offered a partnership to one of his old-time friends in the drug-store, who refused it because he was afraid to try something new. That partnership to-day, thirty years afterward, is worth more than a million dollars!

Every one cannot accomplish this, of course, but the man who is alive, alert to new conditions, and ready to investigate the opportunities opened to him, is assuredly running a better chance of coming out on top than the fellow who is standing stock-still "waiting for something to turn up."

Answers, inquiries, and enrolments have come in to the Agents' Bureau from every State in the Union, from Canada, Mexico, the Canal Zone, the West Indies, and half a dozen out-of-the-way corners where the manufacturer normally cannot effect distribution. The gate is opened to them through the Agents' Bureau, and the results achieved by advertisers using this service to secure representation in new fields have been truly remarkable.

To the reader, we say: "Read these advertisements and answer them."

To the advertiser, we say: "We know this Bureau will bring you results, because we have the documentary evidence to prove what it is doing day by day."

$12.00 Brings $1000.00

This is for you—man or woman, young or old. This is your chance to start in business for yourself with only $1.00 that will net you easily $1000.00 this season. Big money selling one minute post photographs. Everybody buys. 50% profit for you on each sale. NO PREVIOUS EXPERIENCE NEEDED to make a success at once with our

One Minute Camera

The biggest money-getter of today. Takes, finishes and delivers post card photos in one minute. Not a tintype camera. Takes pictures direct on paper post cards. The pictures are finished right within the camera without a dark-room and without plates or films. This One Minute Camera makes pictures on 2½ x 3½ inch post cards and on one inch photo buttons. Takes groups as well. Pictures in saloons, conventions, parks, street corners, country towns, and large cities—all regular gold-mines for the One-Minute Man.

Complete Outfit $12.00

This starts you in business. Outfit includes One Minute Camera, tripod, and everything to make 50 completely finished pictures. Small cost of additional supplies your only expense. Order your outfit today—right from this ad—or write at once for complete, free information.

THE ONE MINUTE CAMERA COMPANY
Dept. 202 568 S. Clark St. Chicago, Ill.

Protecto Ovenette

For Oil, Gas, Coal or Wood Stoves
Patented. Newest, [illegible]
NEVER SCORCHES—NEVER BURNS
Easily demonstrated. Is collapsible, and as easy [illegible]
J. F. CONNOLLY, Inc., 123 Liberty St., New York

$7.50 and up

$29.50 in Two Days

is what Mr. Ewald of Milwaukee made with our

Diamond Post Card Gun

[illegible] It takes 3 sizes Post [illegible] Paper Dolls, etc.
WITHOUT PLATES OR FILMS
[illegible] Thrives on the SPOT [illegible]

International Metal and Terro Co.
Dept. C51 2223 W. 12th St., Chicago

Mend the Leaks

in your Granite Tin, Aluminum and Iron Boilers, Kettles, Pans, etc.

with PECK'S Soft Metal RIVETS

Anyone can do it. Quick and easy. No solder, cement or heat. Fit any surface. Send for sample box of 25 assorted sizes, 10c postpaid. Regular package 25c.

PECK & CO., 210 Main St., Batavia, N. Y.

The Railroad and Current Mechanics Agents' Bureau

WE WANT RELIABLE AGENTS

Waist and Suit Materials, Handkerchiefs

Samples FREE.

MITCHELL & CHURCH CO., 236 Water St., Binghamton, N. Y.

HERE IS A CHANCE FOR YOU TO MAKE **$25.00** PER DAY

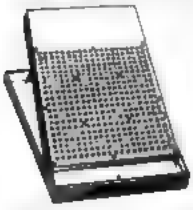
With our Tintype and Postcard Cameras.

Send for Latest Catalogue and Price List Free

NATIONAL PHOTOGRAPH MACHINE COMPANY

Dept. 226, 85 Hester Street, N. Y. City, U. S. A.

Est. 1891



Punch Board

SALESMEN WANTED

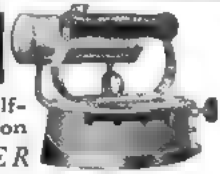
Unlimited possibilities selling our latest Re-fill Punch Board also Premium Outfits for retail dealer. Big profits to the right salesmen. Write for catalog

THE J. W. HOODWIN CO., Dept. C

1005-1007 Madison St., Chicago

$200 A MONTH Operate this or New Model Combination Camera. Takes 4 different sizes of post cards, 2 sizes Paper Post Cards, and a box of Tintype Tin Tags, all developed complete. Requires no experience. Everybody wants to have their picture taken. **The World's Biggest Money-Maker.** Write at once for complete outfit and free camera. The Rochester Tintype Co. Make money the very first day in any locality where you live. Write for particulars and free sample picture.

L. Lascelle, 927 W. 43d St., Dept. 1121, New York



Agents!

The American Self-Heating Flat Iron

IS A WINNER

It will make you larger net profits than anything you ever sold. It gives absolute satisfaction and you can go over the same territory again and again.

100 PER CENT PROFIT

besides liberal cash rebates. Exclusive territory and full protection guaranteed. Swell sample cases and outfits. Summer and fall are the best selling seasons, so now is the time to get busy. If you are open for business and looking for live propositions, write today for ours, or, if convenient, come and see us. It will pay you to investigate—but don't delay. Every day lost now means $10 to $25 to you in profits.

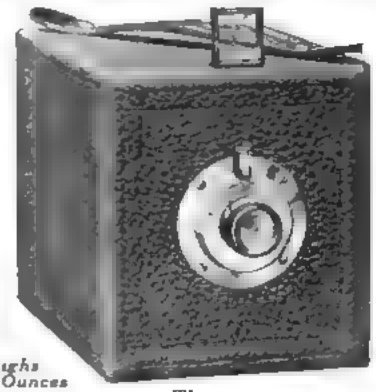
AMERICAN GAS MACHINE CO.,

308 Clark Street, Albert Lea, Minn.

4 IN 1
FOUR-IN-ONE
Do your wringing, mopping, scrubbing and scraping easily in half the time—standing up. WE WANT AGENTS. Sample, $1.50 prepaid. Covered by broad guarantee
Clark & Dupre Manufacturing Co.
814 Foster St., Worcester, Mass.
$1.50
SELF-WRINGING MOP

Just Out!!

A New Camera



Weighs 24 Ounces

The

"Mandel-ette"

The most wonderful sensation of this age. A gigantic success. Every man, woman and child can now be his own photographer. The **"Mandel-ette"** is

A One Minute Camera

that takes and finishes pictures in one minute.

No Experience Needed

No Plates or Films—No Printing or Dark Room

This is just what you have been waiting for—a camera that can be operated easily and **without one bit of experience** in photography. The pictures are snapped **DIRECT ON THE POST CARDS** and are finished right in the camera in less than one minute.

The **"Mandel-ette"** weighs only 24 ounces and combines a camera, dark room and developing chamber all in one. Carries fifty 3½x5½ inch post cards (4¾x3¼ inches) at one time. **Loads in day light.** The **"Mandel-ette"** has special new universal lens. Perfect working glass—each lens tested. Our simple developer finishes the picture in less than one minute. **No over-developing.** So simple that a child can make perfect pictures and guarantee. **Get a "Mandel-ette" for your vacation and have real fun taking pictures.** No experience, no bother or expense. Everybody will soon have the **"Mandel-ette."** GET YOURS NOW. Take advantage of this

Special Introductory Offer

To introduce the **"Mandel-ette"** everywhere, we make this special, attractive offer to you

$5 For a Complete Outfit $5

5c Parcel Post 50 Cents Extra

This outfit includes the wonderful **"Mandel-ette"** camera and everything that is needed to make sixteen finished pictures. A Souvenir Post Card is given per package. The **"Mandel-ette"** and Coupon our absolute guarantee

Your Money Back If Not Satisfactory

Send $5.00 With This Coupon Today

SPECIAL OFFER COUPON

The Chicago Ferrotype Co.

A-9 Ferrotype Bldg., Chicago, or Dept. A-9, 89-91 Delancey St., New York

GENTLEMEN: Inclosed please find $5.00. Ship me by parcel post, prepaid, one complete MANDEL-ETTE camera and complete outfit for making six finished photographs.

Name .....

Address .....

Town ..... *State* .....

Send today for free descriptive booklet to either office.

THE CHICAGO FERROTYPE COMPANY

A-9 Ferrotype Bldg., Chicago, or Dept. A-9, 89-91 Delancey St., New York

The Railroad and Current Mechanics Agents' Bureau

Prof. Hirsch's Preparations Exterminate Flies and Mosquitoes

No household need suffer this summer because of flies or mosquitoes. Prof. Hirsch's two great summer preparations absolutely eliminate these pests.

Prof. Hirsch's Moskidoo Prof. Hirsch's Fly Exterminator

Ask Your Dealer for Them Sizes 10, 25, 50 Cents.

Our Dealers All Make Money Write to us at once and we will [illegible]

PROF. HIRSCH CHEMICAL CO. (Inc.), 28 Elm St., New York

AGENTS

Here's what they all want Sell "Ambrew" Concentrated Extract for Making Beer at Home.

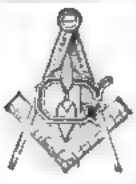
SAMPLE CASE FREE

[illegible] man sells fast, [illegible] complete, carry [illegible] Write Department for Novelties and Premium Plan. All you need is the [illegible] on get ready for the warm weather [illegible] big [illegible] of $50 a week or more. Looks good to you? Send at once.

THE AMBREW COMPANY, Dept. 1958, Cincinnati, O.

AGENTS wanted for this new SELF HEATING IRON, over 250,000 satisfied users, guaranteed and warranted, daily sales. Catalog and new selling plan to hustling agents. G. H. Shubert, Mfg. Dept., 4321 S. Halsted Street, Chicago.

AGENTS New invention. Scrubs like up water. No wringing, no cloths, less work. Big sales—big profits. Exclusive territory. Write today. Special terms. PHIRUS MFG. CO., Dept. 285, Chicago, Ill.



Send for a Complete Catalogue of

MASONIC BOOKS Jewelry and Goods

REDDING & CO.

Publishers and Manufacturers

Dept. R, 200 Fifth Avenue, New York

[illegible] forever. [illegible] $8.50 [illegible] $11.00 [illegible] Send No Money [illegible] Free [illegible] genuine [illegible] Write Today for FREE [illegible]

FRANCIS E. LESTER CO., Dept. MLG, Mesilla Park, New Mexico

MR. AGENT: To appreciate the

Novitas Watch Pocket Lighter

[illegible] 25c

[illegible] "ZIPP IT LIGHTS"

[illegible]

NOVITAS SALES CO. Sole Manufacturers

720 High Street Waltham, Mass.

MEXICAN DIAMONDS

LOOK and WEAR LIKE REAL DIAMONDS, yet COST 1-20th the Price

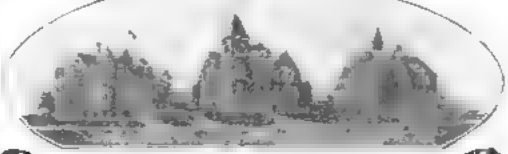
[illegible] one of the most beautiful of all gems when you can buy genuine Mexican Diamonds. Not imitations—but the equal of the finest South African gem when worn **side by side.** Stand all tests—perfectly cut and polished. They [illegible] **blue-white** brilliancy and **guaranteed for life.** Set only in solid gold mountings. Ladies' Tiffany Ring (like cut) with ½ carat gem **price $8.50.** [illegible]

Special to Introduce Only $4.98

[illegible] Gent's Belcher ring with ½ carat gem **price $15** special for **$11.98.** [illegible] Write today for free illustrated catalog

MEXICAN DIAMOND IMP. CO., Dept. ER8, Las Cruces, N. M.

Exclusive controllers of the Mexican Diamond



Learn a Paying Profession

that [illegible] a good income & [illegible] position for life. For seventeen years [illegible]

PHOTOGRAPHY

Photo-Engraving and Three Color Work

Our graduates earn $20 to $50 a week. We assist them to secure these positions. Learn how you can [illegible] Write for [illegible]

ILLINOIS COLLEGE OF PHOTOGRAPHY

751 Wabash Avenue Effingham, Illinois

DIAMONDS-WATCHES ON CREDIT

The Best Gift of All

MEN'S 12 SIZE THIN MODEL WATCH, 17 JEWELS, ADJUSTED, **ELGIN, WALTHAM,** or **HAMPDEN** movement. Warranted accurate. Finest gold strata case, guaranteed 25 years; artistically engraved, engine turned, plain polished or your monogram engraved **FREE.** Eighty per cent of all men's watches sold today are these neat open face Thin Models. At our Special Sale price of $18.95, with monogram engraved free, this watch has no "running mate" in the world. Sent all charges prepaid on

30 DAYS FREE TRIAL

THEN $2.00 A MONTH If not satisfactory, return at our expense.

These Diamond Rings are the famous Loftis "Perfection" 6-prong 14k solid gold mountings. Finest pure white diamonds.

CREDIT TERMS: One-fifth down, balance divided into eight equal amounts, payable monthly. Sent prepaid on approval. Write for free catalog, containing over 2,000 illustrations of Diamonds, Watches, Jewelry, etc. It tells all about our easy credit plan. Local Representatives wanted.

No. N75

Guaranteed 25 Years

LOFTIS BROS. & CO., Diamond Merchants.

Dept. C849, 100 to 108 N. State St., CHICAGO, ILL.

Branch Stores: Pittsburgh, Pa., and St. Louis, Mo.

Any Size You Want

The Gasoline Engine Sensation of 1913

The Genuine Chilled Cylinder Engine

Pronounced by experts to be a marvel of simplicity, reliability and economy. Invention of Wonderful **Chilled Cylinder** combined with the **Multiple Compression** makes it deliver maximum of power every minute. If you have ever used an engine this one will be a revelation to you. Absolutely guaranteed for 5 years with no "ifs" or "buts."

$15.50 And You Keep This Remarkable Engine

Only $15.50 as a first payment, then rest on easy monthly installments. An unparalleled opportunity to get this wonderful engine. You must take advantage of this offer **NOW.** You get it at the absolutely rock-bottom price—the same price that even the wholesaler must pay.

30 DAYS FREE TRIAL

Work it hard. Give it a thorough trial. We want you to be convinced of its remarkable merit before you even think of buying. Let the engine make its own claims.

FREE Book Write today for new book, "How to Use Power." It will help you. It comes free and postpaid. Also ask about the great free trial offer. A postal will do. Write now.

Schmidt Bros. Engine Works, Dept. 110Z, Davenport, Ia.

$50 A WEEK EASY FREE SWELL SUIT

We do exactly as we say—fulfill every promise. Many agents who failed with insignificant outfits of others have made **big money** from the start with our **big elegant free outfits.** They coin money daily—hourly. We are the leaders in wholesale tailoring of men's made-to-measure clothes. Sweller styles, more exclusive patterns, most reasonable prices. Sweep aside all competition! Send postal today for handsomest, most complete outfit ever gotten up—a quick and sure money maker—$50 a week for you **easy!**

No Money—No Experience!

Simply show your samples—Elk values do the rest—bring you the orders—they positively cannot be equaled anywhere. We take all the risk—pay all express charges—back up every garment with strongest money-back guarantee of satisfaction. We give you

YOUR FREE SUIT

that makes you the sweetest dresser in town—they all order from you to get clothes like yours at your low prices. Biggest chance—exclusive territory. You can't afford to miss it. **Write postal today sure!**

ELK TAILORING CO.
788 Jackson Blvd., Chicago

FREE HANDSOME OUTFIT

Guaranteed Limbs that Are Worn by 16,000 Men and Women

Why wear a stiff, uncomfortable Artificial, when the **HANGER** Improved Limb insures graceful walking and comfort in wearing?

WE GUARANTEE IN HANGER LIMBS a **comfortable** socket, easy ankle action, freedom from complicated parts and ease in walking. This guarantee, good for **Five Years,** is backed by fifty-two years' experience in manufacturing and **wearing** artificial limbs.

We have an interesting proposition for anyone who has lost an arm or leg. Tear off the lower margin of this page, give the nature of your amputation, sign your name and address and mail it to the nearest factory. You will get by return mail a copy of our treatise on artificial limbs entitled "Nature's Rivals." Asking for it entails no obligation.

J. E. Hanger, Inc. 922 G Street, N. W., Washington, D. C.
1918 Olive Street, St. Louis, Mo.
208 Pryor Street, Atlanta, Ga.

Write Your Name on the Lower Margin of this Page and Mail

Symbols of Protection

Ancient Egyptians carved over their doorways and upon their temple walls the symbol of supernatural protection; a winged disk. It typified the light and power of the sun, brought down from on high by the wings of a bird.

Mediæval Europe, in a more practical manner, sought protection behind the solid masonry of castle walls.

In America we have approached the ideal of the Egyptians. Franklin drew electricity from the clouds and Bell harnessed it to the telephone.

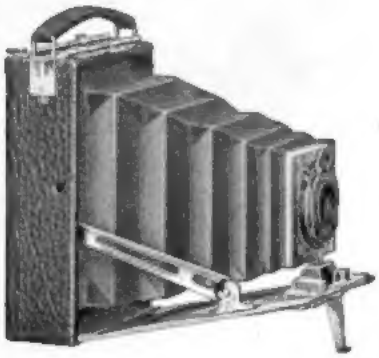
Today the telephone is a means of protection more potent than the sun disk fetish and more practical than castle walls.

The Bell System has carried the telephone wires everywhere throughout the land, so that all the people are bound together for the safety and freedom of each.

This telephone protection, with electric speed, reaches the most isolated homes. Such ease of communication makes us a homogeneous people and thus fosters and protects our national ideals and political rights.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy *One System* *Universal Service*



You can get good pictures just as soon as you get a

PREMO

You need no previous experience, no technical knowledge. Step into the dealer's to-day and see for yourself, how easy Premos are to load and operate, how light and compact, and how altogether desirable.

This picture is from a negative made with the Premoette Jr. No. 1, a marvelously compact little camera which will slip into any pocket, or a lady's handbag, and costs but $5.

And then there are the Film Premos No. 1, just as simple to operate, but making larger pictures —3¼x4¼, $10.00; 4x5, $12.50; 3A (post card size), $12.50—and many other models ranging in price from $1.50 to $150.00.

Get the new Premo catalogue

A book that no one interested in photography should be without. It describes the many Premo advantages fully—the daylight loading Film Premos, the Premos that take films or plates with equal facility, the Premo Film Pack and tank developing system.

It's free at the dealer's, or will be gladly mailed to any address on request.

Rochester Optical Division
Eastman Kodak Co. Rochester, N. Y.

From a Premoette Jr. No. 1 Print
Actual Size

If it isn't an Eastman, it isn't a Kodak.

From a Kodak Negative (reduced)

Take a KODAK with you

Let pictures, made from your own point of view, keep the story of your personal impressions.

Catalogue free at your dealers, or by mail.

EASTMAN KODAK CO.,

ROCHESTER, N. Y., *The Kodak City.*

THE MUNSEY PRESS, NEW YORK.